PREVENTION OF PRETERM BIRTH:

THE ROLE OF PRENATAL CARE

by

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CHAPTER I

Despite the numerous technological advances of modern obstetrics, prematurity remains the leading cause of perinatal morbidity and mortality in the United States. Approximately 8% of all births in the United States occur before 37 weeks gestation and these preterm infants account for up to 80% of all infants who die within the first months of life (National Center for Health Statistics, 1982). The infant mortality rate has decreased from 24.7 infant deaths per 1000 live births in 1965 to 13.8 in 1978, a 44% decrease (U.S. Department of Health and Human Services, 1981) largely due to improved management of the preterm infant. The rate of prematurity has remained the same, despite the research emphasis on the pharmacological inhibition of preterm labor. Clearly a new approach to the problem is needed. This study will explore the role of prenatal care in the prevention of preterm birth.

Traditionally, prematurity has been defined as delivery of a low birthweight (LBW) infant weighing less than 2500 grams. More recently, researchers and practitioners have found this definition to be inadequate in that it does not differentiate between true preterm babies born prior to 37 weeks gestation and full term infants who are small for gestational age (SGA) (Berkowitz, 1981; Johnson & Dubin, 1980; Kaltreider & Kohl, 1980; Lubchenco, 1981). Many studies on prematurity have included all LBW infants regardless of gestational age. An estimated 50% of LBW infants are preterm (National Center for Health Statistics, 1982).

Most studies of the relationship between inadequate care and prematurity have focused on the amount of care received such as the number of visits or the time of onset of care, rather than the content of the care received. Prenatal care is rarely defined or separated into its components. The purpose of this study is to identify specific aspects of prenatal care which may be important in prevention of preterm birth.

This study is of relevance to nurses who provide care to women during their pregnancies in their roles as practitioners, clinic nurses, public health nurses and childbirth educators. In light of the fact that the medical approach has not been entirely effective, this study will focus on a nursing approach to prenatal care. The role of health promotion and education, psycho-social support and access to care will be emphasized.

Review of the Literature

This review of the literature will begin with a brief overview of the physiology of parturition and will then cover the risk factors associated with preterm delivery. These factors will be grouped into five broad categories: medical/obstetric, sociodemographic, psycho-social, health practices and lack of prenatal care. The review will also include studies relating prenatal care to prevention of pre-maturity and identify those aspects of prenatal care which may contribute to prevention of preterm births. Intervention studies utilizing these preventive strategies will also be described.

Physiology of Parturition

The mechanisms by which labor is initiated, whether at or before term remain poorly understood. A major change in the contractility of the uterus occurs when labor begins. Various hormonal influences have been studied in both preterm and term parturition but a hormonal "trigger" has not been verified (Huszar & Roberts, 1982).

Estrogen affects uterine contractility by increasing actinomysin concentration, gap junction formation and prostaglandin synthesis (Castracane & Jordan, 1975; Garfield, Kannon, & Daniel, 1980). During pregnancy the effects of progesterone on the uterus predominate and counteract the effects of estrogen. Through the action of progesterone the muscle cell membranes and lysosomes are stabilized and the release of arachadonic acid, the precursor to prostaglandins, is prevented (Huszar & Roberts, 1982). An increase in the ratio of estrogen to progesterone is associated with the onset of labor (Thornburn & Challis, 1979). The declining levels of progesterone cause lysosomal disruption, activation of the arachadonic acid-prostaglandin pathway and increased production of prostaglandins. Prostaglandins in turn cause cervical ripening and uterine contractions resulting in labor (Huszar & Roberts, 1982).

This phenomenon is currently the most accepted starting point for the initiation of labor (Huszar & Roberts, 1982). Higher estradiol and lower progesterone levels have been documented in women in premature labor than in normal controls (Cousins, Hobel, Chang, Okada, & Marshall, 1977; Csapo, Pohanka & Kaihola, 1974; Tamby-Raja,

Anderson, & Turnbull, 1974). Elevated prostaglandin levels in women who deliver prematurely have not been consistently documented (Johnson & Dubin, 1980). The causes of the change in the estrogen/progesterone ratio have not been elucidated and even less is known about the mechanisms which may trigger this change before term (Huszar & Roberts, 1982). Decreased uteroplacental blood flow, placental factors and fetal distress may play a role (Johnson & Dubin, 1980).

Risk Factors Associated With Preterm Delivery

Medical/Obstetric Factors. Kaltreider and Kohl's (1980) study encompassed over 240,000 deliveries between 1970 and 1976. They examined prematurity in terms of both birthweight and gestational age and found the following medical/obstetric complications to be associated with a three-fold or greater increase in the risk of preterm delivery: abruptio placenta, placenta previa, eclampsia, multiple pregnancies, renal disease, liver disease, history of previous preterm birth, anemia and uterine anomaly. Other significant factors were chronic and pregnancy-induced hypertension, congenital anomalies, history of spontaneous abortion and polyhydramnios. Other studies have demonstrated similar findings (Berkowitz, 1981; Gaziano, Freeman & Allen, 1982; Niswander, 1978). Although the risk of prematurity with any of these complications is high, because frequency of their occurrence is low they do not account for a large percentage of preterm deliveries (Johnson & Dubin, 1980).

Arias and Tomich (1982) studied 537 infants with birthweights between 600 and 2500 grams. Of the 355 preterm deliveries, 34.9%

delivered early because of premature rupture of membranes, 29.8% because of preterm labor and 34.6%because of maternal or fetal problems. In 22% of the cases of preterm labor, subclinical chorioamnionitis, urinary tract infections or anatomic abnormality of the uterus were identified. Preterm labor of unknown origin occurred in 23.3% of all preterm deliveries.

Premature rupture of the membranes (PROM) is a significant factor in preterm delivery (Kaltreider & Kohl, 1980; Arias & Tomich, 1982). Recent studies have found smoking, previous cervical operations and lacerations, chorioamnionitis and recent sexual intercourse to be associated with PROM (Gibbs & Blanco, 1982; Naeye, 1982). Certain organisms in the vaginal flora, most notably Group B Beta-hemolytic streptococci, Chlamydia tracomatis and Neisseria gonorrhoeae, have been associated with PROM and preterm delivery (Minkoff, 1983). However, none of the factors identified account for more than a fraction of the cases of PROM.

Sociodemographic Factors. Sociodemographic factors play a large role in the epidemiology of prematurity. Approximately 40-60% of preterm deliveries are associated with low socioeconomic status (Hemminki & Starfield, 1978; Johnson & Dubin, 1980). The number of preterm births rises with declining socioeconomic status regardless of whether education, occupation or income is used as the indicator of status (Berkowitz, 1981; Chase, 1973; Eisner, Brazie, Pratt & Hexter, 1979; Garn, Shaw & McCabe, 1978; Hardy & Mellits, 1978; Kaltreider & Kohl, 1980; Placek, 1978). Although low socioeconomic status is one

of the factors most consistently associated with preterm delivery, very few studies have attempted to look at the mechanisms through which this occurs. Malnutrition, small stature, lack of education, psychological or physical stress and lack of prenatal care have been the more frequently cited mechanisms (Johnson & Dubin, 1980).

Other sociodemographic factors include race, age, parity and marital status. Prematurity occurs more frequently among infants born to primiparas and women of parity greater than four, and to women younger than 18 and older than 35 (Berkowitz, 1981; Eisner et al., 1979; Garn et al., 1978; Kaltreider & Kohl, 1980; Stickle & Ma, 1977). Single women and those experiencing an unplanned pregnancy are also at higher risk for prematurity (Chase, 1973; Johnson & Dubin, 1980; Pratt, Janus & Sayal, 1978; Stickle & Ma, 1977). The incidence of preterm delivery is about twice as high for Blacks as it is for Whites (Garn et al., 1978; Hardy & Mellits, 1978; National Center for Health Statistics, 1982; Pratt et al., 1978; Stickle & Ma, 1977). This difference is not statistically explainable by differences in income, education or occupation (Garn et al., 1978). Many of these risk factors tend to cluster making causal relationships difficult to determine. For example, very young, Black women who are pregnant are also likely to have not planned the pregnancy and be poor and unmarried. It is difficult to determine the independent effects and relative importance of each of these variables on outcome.

Psychosocial Factors. Psychosocial variables have not been extensively studied. Most of the studies that have been done are

retrospective. Newton, Webster and Binu (1979) in their study of the effects of psychosocial stress on outcome in 132 consecutive women going into labor, found that the incidence of major life events in one week preceding the onset of labor was much higher in the preterm group than in those delivering after 37 weeks gestation. The groups were not statistically different with regard to age, gravidity or parity. Their results also appeared to be independent of any effects of social class.

In her retrospective case-control study Berkowitz interviewed 175 mothers of preterm infants and 313 randomly selected mothers with term infants. She found that a lack of leisure-time physical activities during pregnancy were significant risk factors. The characteristics of the groups with respect to age, race and socioeconomic status were similar. Therefore, the association of preterm birth with lack of recreation and a negative attitude towards the pregnancy held.

Gaziano et al. (1981) compared 165 pregnancies which resulted in low birthweight infants with 154 which did not for a number of risks which were detectable by 24 weeks gestation. Data were collected retrospectively on each patient by reviewing the medical records which included a detailed history taken at the initial visit and a record of the prenatal course. Term infants were included in the low birthweight group and gestational age was based on menstrual dates rather than on clinical evaluation of the newborn. Gaziano et al. reported that the patient's perception of her own negative treatment as a child by her parents was a significant risk factor. The patient's attitude

towards pregnancy and the extent of her social support were not.

Other retrospective studies of psychosocial factors have found that mothers of prematures had more personal, physical and psychological problems (Gunter, 1963), more negative feelings about their pregnancy and less emotional maturity (Blau, Slaff, Easton & Wilkowitz, 1963). In utilizing data from retrospective studies it is important to realize that having a preterm infant will affect a woman's feelings, emotions and perceptions. Thus, these findings may not indicate a pre-existing problem but rather distress due to having delivered prematurely.

Very few prospective studies on psychological variables have been done. Herms, Gabelman & Kubli (1982) interviewed 131 women prospectively before the 20th week of their pregnancies. The standardized questionnaire included items on education, sexual history and partner relationships. In addition an objective personality inventory of social attitudes was administered. After the course and outcome of pregnancy were documented, 47 patients with premature labor were compared to the 84 women who went to term. The groups did not differ in terms of age, education, profession, medical/obstetric history or economic situation. Women who delivered at term showed strong attitudes toward social adaptation, flexibility, self health care and strong family relationships. The women who delivered prematurely were more self-confident, resolute, rigid and had difficulties making their demands compatible with reality. The authors did not give the sociodemographic characteristics of the sample and thus the risk status and

the generalizability of the study's findings are uncertain.

Ching and Newton (1982) examined several psychosocial variables in a prospective study of 355 women. They found that life stress, personality characteristics, attitude toward pregnancy, psychosocial support, health habits, food habits and social background experiences were not significant precursors of preterm delivery.

Health Practices. Health practices affecting length of gestation include smoking, nutrition, alcohol consumption, sexual activity, and working. Most of the data on smoking and prematurity are from studies of low birthweight infants. According to Meyer (1978) the relationship between maternal smoking and reduced birthweight has been clearly and consistently shown under all conditions in over 45 studies encompassing more than a half-million births. Smoking is associated with an increased incidence of preterm delivery as well. The increase in perinatal mortality with smoking is closely related to this increase in preterm delivery (Garn et al., 1978; Meyer, 1978; Van den Berg, 1978). However, many of the factors related to LBW and preterm delivery are also associated with an increased incidence of smoking. In addition, smoking increases the incidence of abruptio placenta, placenta previa and PROM, all of which are associated with preterm birth. Studies are needed to determine the interactions producing these complications.

Few would question the importance of good maternal nutrition during pregnancy but the mechanism by which nutrition exerts its influence is unclear. The Dutch Famine Study (Susser & Stein, 1978)

was unique in that the effects of a naturally occurring famine of limited duration on perinatal outcome could be documented. Data showed that when famine occurred at the time of conception or in the first trimester and nutritional rehabilitation had been achieved by the time of birth, there was no change in the average birthweight. Birthweight rather than gestational age was the outcome studied. Low maternal pre-pregnant weight, small stature and poor weight gain during pregnancy have also been correlated with preterm delivery (Berkowitz, 1981; Gaziano et al., 1981; Hardy & Mellits, 1978).

Berkowitz (1981) found higher alcohol intake among women who delivered preterm infants than among those delivering at term. The effect of alcohol intake during the first and second trimesters on delivery was significant when the effects of cigarette smoking, marital status and socioeconomic status were controlled for.

The relationship between sexual activity during pregnancy and prematurity is unclear. Goodlin, Keller and Raffin (1971) did find an increased frequency of orgasm among women who delivered prematurely compared with those who delivered at term. However, their study had two major drawbacks. By comparing the frequency of orgasm in the two groups right before they went into labor, i.e. at different stages of gestation in the term and preterm group, they do not take into account the fact that there is normally a decline in sexual activity as pregnancy progresses to term. In addition, the two groups were not at comparable risk for preterm delivery.

Wagner, Butler and Sanders (1976) found an association between

frequent or intense orgasm and prematurity. Their sample of 19 preterm and 19 full term mothers was matched for age, gravidity and race. Because of the small sample size tests of statistical significance were not done. The sample was almost entirely Caucasian, married, in their twenties and with a high school education. Other risk factors for prematurity such as previous medical/obstetric history were not controlled for.

Other studies however, have failed to show an association between frequency of orgasm and premature labor (Perkins, 1979; Rayburn & Wilson, 1980). Rayburn and Wilson did find a significantly greater frequency of coitus in the preterm group with no primary predisposing condition for premature labor such as PROM, prior premature delivery, multiple gestation, third trimester bleeding or medical disorders but the number of patients in this group was small (18 of 111 cases). There is no consensus in the literature as to an increased risk of premature delivery with normal coital activity during pregnancy.

The effect of working on the incidence of preterm labor is unclear and probably related to socioeconomic status. Whereas some studies have found no effect of maternal employment, others have found prematurity to be associated with unemployment (Diddle, 1970). On the other hand, Kernek, Osterud and Anderson (1966) found physically demanding work to be correlated with the frequency of preterm birth.

Lack of Prenatal Care. Kaltreider and Kohl (1980) found that 15% of patients with no prenatal care had preterm infants compared with 2.7%, 4.9% and 4.6% of those initiating care in the first, second and

third trimester, respectively. Eisner et al. (1979) using multiple regression analysis found that if all other factors are the same, a woman who has not received prenatal care is five times as likely to give birth to a LBW infant. They studied over 500,000 births and found an 18.9% incidence of LBW in women with no care and 5.7% in women with care in the first trimester. The results were the same when gestational age was used as the indicator of prematurity.

This adverse effect of no prenatal care has been documented in other studies (Chase, 1973; Gibson & Colley, 1982; Sokol, Woolf, Rosen & Weingarden, 1980) which are summarized in Tables 1 and 2. These results must be interpreted with caution, however. First of all, women who deliver at an earlier gestational age have less time to seek prenatal care. Terris and Glaser (1974) studied 4638 black women with LBW infants and 4638 Black women with infants weighing over 2500 grams. They were matched for age, parity, marital status, hospital and sex of the infant. Of the LBW infants, 1714 were under 36 weeks gestation. By using a modified life table analysis which controlled for shortened length of gestation, Terris and Glasser (1974) found that the percentage of women initiating care in each trimester was the same in the two groups (Table 1). They concluded that early birth prevents initiation of prenatal care rather than vice versa. Their study included only Black women and only 8% of these women began care in the first trimester compared with 37% in Kaltreider and Kohl's (1980) large epidemiological study.

In addition, the differences in preterm delivery rates that have

Table 1

Percentage of Preterm Births, by Mothers' Receipt of Prenatal Care: Reports of Three Studies

Receipt of Prenatal Care	Percentage of Preterm Births Reported by		
	Kaltreider & Kohl (N=240,000)	Gibson & Colley (N=316)	Sokol et al. (N=5131)
Onset of care in First Trimester	2.7		
Onset of care in Second Trimester	4.9		
Onset of care in Third Trimester	4.6		
Care, onset not reported		5.6	2.6
No prenatal care	15.0	10.2	10.2

Table 2

Comparison of Preterm and Full Term Mothers' Receipt of Prenatal Care: Reports of Two Studies

Trimester of Onset of Care	Percentage of Mothers Receiving Care			
	Terris & Glasser (N=3428)		Chase (N=142,017)	
	Preterm	Full Term	Preterm	Full Term
First Trimester	7.9	7.4	19.2	35.3
Second Trimester	44.8	43.6	41.4	45.2
Third Trimester	37.2	32.6	39.4[a]	19.6[a]
No Care	10.1	16.4		
Total	100.0	100.0	100.0	100.0

[a] Onset in third trimester, no care and not stated combined

been found may not be due to prenatal care itself but rather to differences in the characteristics of those who seek and obtain that care. Socioeconomic status, age, race, marital status, motivation and desirability of the pregnancy are factors associated with prematurity which might affect whether or not a woman seeks care. For example, Ryan, Sweeney & Solola, et al. (1980) found that teenagers, older women and unmarried mothers are significantly less likely to receive care before the third trimester.

According to Thompson (1981), women who register early for care are more likely to have a known source of payment for care, be older, married and have planned the pregnancy. Thus, it appears that acceptance of the positive value of prenatal care, a positive attitude towards the pregnancy and the motivation of the patient and her family also affects whether or not a woman seeks prenatal care. In addition, barriers such as transportation, financial problems, childcare, language and cultural barriers, facility atmosphere, as well as denial of the pregnancy, fear and apathy all interrelate to determine whether or not a woman is likely to receive prenatal care (California State Department of Consumer Affairs, 1982; Gibbs, Martin & Gutierrez, 1974; Parsons & Perkins, 1982; Slatin, 1971).

Thus, in many instances the factors which influence maternal care-seeking behavior are the same as those which are associated with preterm delivery. In order to determine the difference in preterm rates of women with and without care, the two groups should be comparable with regard to these factors. Gortmaker's (1979) analysis

of all birth and infant death records in New York City in 1968—over 90,000 births—controlled for a wide variety of social, demographic and medical factors, factors which tend to select mothers into getting or not getting prenatal care. In addition, the quantity and timing of prenatal care were adjusted for length of gestation. He found that the benefits of prenatal care varied by social status and race. Black mothers and white mothers delivering on a general service were more likely to deliver a LBW infant if they received no prenatal care. Greenberg (1983) also found that prenatal care had the greatest observed impact on socially disadvantaged women.

Impact of Adequate Prenatal Care on Prematurity

Determination of a relationship between inadequate prenatal care and preterm birth is not sufficient. The essential effective elements of prenatal care must be delineated and appropriate intervention studies initiated and evaluated. The first step in this process is to examine the impact of adequate prenatal care on prematurity.

Faundes, Hardy, Diaz and Pinotti (1982) defined "good" prenatal care as "initiation of care before the fifth month of pregnancy, at least five visits and the recording of at least body weight and blood pressure during every visit" (p. 107). Their study of 20,000 births in a low income, low education population in Chile found the highest proportion of preterm delivery among single women and women with less education. However, among women with good prenatal care, marital status and difference in education were no longer significant. They concluded that good prenatal care can change the poor prognosis

associated with illiteracy.

Breart, Goujard, Blondel, Maillard, Chavigny, Sureau and Rumeau-Rouquette (1981) studied 2172 women seen in two different obstetric units in France. One group of women received "intensive supervision" defined as one visit per month in the first two trimesters and one every two weeks in the last trimester. The other group received "restricted supervision" consisting of the legal minimum requirement of four visits, although most were seen monthly. The subjects were not randomly assigned to the "intensive" versus "restricted" group. Women at high risk for preterm birth due to age, previous preterm or LBW infant or medical conditions were excluded from the study and women of low and average risk in the two groups were compared. Low risk women were defined as those who were married and of upper social class. Average risk women were women who were neither low risk nor high risk for premature labor. The percentage of births before 34 weeks gestation was significantly lower for mothers of average risk who received intensive supervision than for women of averge risk receiving fewer visits. There were no significant differences between the groups for the low risk women. This study indicates that increased frequency of prenatal visits may be important in preterm birth prevention.

Nurse-midwives providing prenatal care to low income populations have been effective in improving infant outcome. (Haire, 1981; Levy, Wilkinson, Marine, 1971; Meglen, 1976; Reid & Morris, 1979; Ross, 1979). In all of the studies, the institution of a midwifery program

resulted in an increase in the number of prenatal visits, a decrease in the number of women receiving no prenatal care and a decrease in infant mortality. In interpreting these results, however, one must allow for the possibility that women who come to midwives for care may have had healthier behavior patterns and more education.

Levy et al. (1971) compared the outcome of 969 births during the midwifery program with 747 births after the program was discontinued. Their retrospective study showed that the prematurity rate increased by almost 50% and the neonatal mortality rate more than tripled after the program ended. It is difficult to determine whether it was the fact that the midwifery program provided care where none was available before or the midwifery care itself that made a difference. However, there was an abrupt decrease in the number of prenatal visits with twice as many women receiving no prenatal care after the program ended although other options for care were available at that time. It appears that the discontinuation of the nurse-midwife program resulted in less care and poorer quality of care and was responsible for the increased prematurity and neonatal mortality.

Aspects of Prenatal Care Important for Prematurity Prevention

Once the impact of adequate prenatal care on prematurity has been documented, it is important to separate prenatal care into its component parts and determine which of these aspects might play a role in prevention of preterm birth. Unfortunately, few studies have done this.

In a well-controlled prospective study of more than 50,000

patients, Sokol et al. (1980) compared outcomes of two groups which were similar in terms of race, socioeconomic status, age, parity and marital status. One group received antepartum care in a special Maternity and Infant Care Project (M&I) which in addition to medical services, included a multidisciplinary assessment, counselling, home visits and parenting guidance. The control group (non-M&I) attended the same obstetric clinic at the hospital as the M&I group but did not receive the ancillary services. The groups were not randomly assigned. Despite the similar social and antepartum/intrapartum risk of these groups and the same intrapartum care, the perinatal mortality rate was 60% lower in the M&I group. There was no difference between the groups in risk of preterm delivery but the M&I group had significantly lower rates of preterm births than the non-M&I group. The authors concluded that the following components of antepartum care may be important in improved outcome: multidisciplinary approach, health education, nutrition counselling, social service assessment and intervention, special services for adolescents and delinquent appointment follow-up. They suggested that the improved outcome may be due to amelioration of risk of preterm delivery for the medically indigent patient, but did not discuss how this may occur. In addition, M&I patients began their care earlier in gestation and may have received more care over a longer duration than the non-M&I patients. Improved access to care provided by outreach clinics and the goodwill and reputation the M&I project held in the community may have been responsible for the earlier registration for care. Thus, improved

access to care may be an important factor in preterm birth prevention. This study is significant to nursing as nurses are in an excellent position to coordinate a multi-disciplinary approach to care and provide the "extra" services described. The Vancouver Perinatal Health Project (Warnyca, Ross & Bradley, 1979) is another example of a multidisciplinary team approach which has resulted in improved infant outcome.

Another significant study which related specific components of prenatal care to a decrease in preterm delivery was the University of California, San Francisco Preterm Birth Prevention Program (Herron, Katz & Creasy, 1982). In a one year period, 1422 patients were screened and scored for the risk of preterm delivery at their initial prenatal visit and again at 32 weeks. The scoring system included socioeconomic status, age, past medical and obstetrical history, life style and data from the current pregnancy (Creasy, 1980). Patients in the high risk category were followed weekly by a nurse clinician in a special clinic in addition to their regular obstetric appointment. According to Herron & Dulock, 1982, the components of care received by these women included:

1. Education on the symptoms of preterm labor, self-detection of contractions and how to respond and importance of notifying the care-provider immediately

2. Preventive measures such as increased rest periods, decreased strenuous activity, possible need for decrease in outside work, and decrease in sexual activity

3. Establishment of a relationship with the nurse clinician emphasizing open communication

4. Psychological support.

The staff was also trained to respond promptly to patients' complaints of subtle preterm labor signs so that appropriate intervention to stop labor could be instituted early. The preterm delivery rate dropped from 6.75% in 1978 to 2.4% in 1979 after the program was instituted. Over the same time period, the incidence of preterm delivery at an affiliated institution without the prevention program remained steady. Only 17.5% of the high-risk women actually went into preterm labor as compared with 33% in a previous prospective study (Creasy et al., 1980) using an identical scoring system but with routine prenatal care and no preterm labor preventive measures. The authors point out that the weekly visits and psychological support provided by the special clinic staff might have positively affected the outcome.

While the effectiveness of nurse-midwives has been repeatedly and consistently shown, the components of prenatal care given by nurse-midwives in these programs are usually not addressed. Lehrman's (1981) descriptive study of nurse-midwifery prenatal care is a starting point in delineating the important aspects of such care. The components of care by practicing nurse-midwives determined through the use of taped interviews with clients included: continuity of care, non-interventionist care, family-centered care, education and counselling, preventive care, flexibility, participative care, consumer advocacy and allowance of enough time to meet the clients' needs. A

limitation of her study is the small sample size (n = 23) and the fact that only 9% of the midwives contacted participated in the study. These midwives may not have been representative. Determination of which of these components of nurse midwifery practice might be of importance in relation to prevention of preterm labor, and of how midwifery care differs from standard obstetrical care awaits further study.

Certain aspects of prenatal care which may be important in preterm birth prevention can be extrapolated from these studies. These aspects include:

1. Health education on smoking, nutrition, alcohol, rest, work, signs of labor
2. Provision of a multidisciplinary approach
3. Improved access to care, early care, regular visits and continuity of care
4. Psychological support by the care provider.

Evidence of the importance of these variables in prevention of preterm birth has largely been derived indirectly. However, a few intervention studies have employed these strategies and these are reviewed below.

Intervention Studies

Most preterm birth intervention studies have focused on drug therapy after the onset of preterm labor. These are not at issue here. Rather, only those investigations will be considered which relate prevention of preterm birth to specific aspects of prenatal

care such as health education, psychosocial support and access to care.

Studies on Health Education. Based on the increased risk of preterm birth associated with poor nutrition, smoking alcohol consumption and working during pregnancy, one can postulate that educating pregnant women on these issues might be an effective preventive strategy. Unfortunately, the data to support this hypothesis are sparse. Very few intervention studies on the effectiveness of health education in preterm birth prevention were found.

Attempts to improve nutritional intake during pregnancy have included both dietary supplementation and nutrition counselling. Much research has been conducted on the effects of dietary supplementation but it has mainly focused on the low birthweight infant rather than on gestational age.

Several programs of dietary supplementation during pregnancy have claimed an increase in birthweight in the group receiving the supplement (Lechtig, Hagicht, Delgado, Klein, Yarbrough & Martorell, 1975; Mora, de Paredes, Wagner, de Navarro, Suescun, Christiansen & Herrera, 1979; Rush, 1981) while others have found no significant effect (McDonald, Pollitt, Mueller, Hsueh & Sherwin, 1981; Susser & Stein, 1978). The Montreal diet dispensary program of nutritional evaluation, education and supplementation was associated with a significant increase in birthweight but only a small, non-significant difference in length of gestation (Rush, 1981).

In 1972, Congress authorized the Special Supplementary Food Program for Women, Infants and Children (WIC) to provide supplemental food, nutrition counselling and monitoring of dietary intake to pregnant women. One evaluation study of this program provides evidence that nutrition counselling and supplementation in pregnancy might make a difference in prematurity prevention (Kennedy, Gershoff, Reed & Austin, 1982). The study included 910 WIC and 418 non-WIC pregnant women who were comparable in terms of age and parity and socioeconomic status and were at high risk for obstetrical complications. There was a significantly lower incidence of LBW infants and an increase in length of gestation among WIC participants.

There are many problems inherent in studying nutritional intake and supplementation during pregnancy. Intake as determined by a 24 hour recall period is usually used as an indicator of risk, although it may not be representative of a person's usual eating habits. Studies of the WIC program indicate that 81% of the WIC participants share their food supplements with their families so it is difficult to document whether the pregnant woman is actually getting the supplement. Although the expectation is that supplements would be consumed in addition to the normal diet it is possible that supplements might displace foods normally eaten, especially if the family lacks income to buy other food. In addition, rehabilitation of malnourished women requires an individualized nutritional care plan tailored to the specific deficits, rather than a standard supplement (Jacobsen, 1980).

Only three studies on nutrition counselling and prematurity were

found and two of them used LBW as the indicator of prematurity. Cameron and Graham (1944) gave dietary advice to women in the third trimester and found a significant decrease in the rate of LBW among those who received the nutrition counselling. Berry and Wiehl (1952) report similar results. Different results were reported by Rush (1982) in his review of a study by Lundin and Stark (1980). The original source was not available. Pregnant women attended lectures on nutrition. The mean birthweight, proportion of LBW and proportion delivered preterm were unaffected by the program.

Data on the effects of anti-smoking advice on prematurity are lacking. Only one trial of anti-smoking intervention during pregnancy has been reported in the literature to date (Donovan, 1977). Pregnant smokers were randomly assigned at their first visit to either a group given intensive, individual anti-smoking advice at every visit or to a control group receiving routine prenatal care that may have included some anti-smoking advice. At the onset, the two groups were similar with respect to amount smoked, age, parity and socioeconomic status. As recalled postnatally, the mean amount smoked by the test group was significantly lower than the amount smoked by the control group. However, the proportion of LBW and preterm infants was the same in both groups.

In addition to the problems inherent in using retrospective patient recall as a measure of amount smoked and the difficulty in assessing whether or not the advice was acted upon, one must also take into account other characteristics of women who smoke. Smokers tend

to be of lower socioeconomic status, live under more stressful conditions, and drink more coffee and alcohol than non-smokers. The mother is more likely to work outside the home and less likely to get prenatal care (Meyer, 1978; Van den Berg, 1978). Stopping smoking alone will not necessarily prevent the adverse outcomes associated with some of these factors. The negative results of this one study do not imply that anti-smoking interventions cannot be effective. The effectiveness of antenatal advice remains to be established by future research.

No intervention studies were found which explored the effects of counselling pregnant women about alcohol consumption, working, or sexual activity on length of gestation. Research is needed in each of these areas.

Other Intervention Studies. No studies were found regarding the effects on prematurity of interventions specifically aimed at decreasing psychological stress or providing psychosocial support during pregnancy and its effect on prematurity. Data on access to care are equally sparse and generally derive from other countries with government supported health plans, such as Sweden. There the infant mortality rate is somewhat lower than that of the United States: 8 per 1000 live births in Sweden and 13.8 per 1000 live births in the United States. Prenatal clinics are within easy reach of virtually all Swedish women and about 99% of pregnant women attend these clinics for all of their scheduled visits (Rooth, 1979). The previously reviewed study of Sokol et al. (1980) alluded to the importance of improved

access but did not specifically measure the impact of improved access.

Summary

Evidence is accumulating that improved prenatal care can have an impact on perinatal outcome. The epidemiology of prematurity has been extensively studied although preterm infants have not been consistently distinguished from low birthweight infants. These studies have enabled researchers to develop scoring systems for antenatal prediction of women at increased risk for preterm delivery.

The mechanisms by which prenatal care provided to these and other women can effectively reduce the rate of preterm births is unclear. In order to plan appropriate intervention studies it is necessary to determine the components of prenatal care that make a difference. Most of the studies exploring the relationship between prenatal care and outcome have used birth certificate data regarding onset of care and the number of visits, and hospital medical records as indices of adequacy of care. The impact of specific interventions has not been determined.

The medical approach to prevention of preterm birth and its concentration on pharmacological intervention has not been entirely effective. It is time for a different approach to the problem. There is some evidence supporting the view that improved access to care, health education and psychosocial support are important factors in preventing preterm birth. Before specific intervention strategies can be implemented and evaluated, differences in these components of prenatal care received by women delivering preterm and term infants

should be studied.

Conceptual Framework

The conceptual framework for this study involves current concepts regarding the cause of initiation of labor and ways in which prenatal intervention can impact on this process. A brief overview of the physiology of parturition has been presented in the Review of Literature. Factors thought to trigger parturition, predisposing risks, and ways in which the pathway to premature labor can be interrupted through prenatal care will be discussed.

Factors which may trigger the initiation of labor before term include both maternal endogenous factors such as uterine anomalies and maternal disease, and exogenous factors such as smoking, stress and poor nutrition. Figure 1 summarizes the theoretical relationships of these risk factors to the initiation of premature labor and components of prenatal care which may be effective preventive strategies. While all of these factors may be important, it is not feasible to include all of these variables and interventions in the present study. Because the focus of this investigation is on nursing rather than on medical interventions, only those factors related to nursing care will be examined. Those risk factors and components of prenatal care which will be explored in this study are identified in a box in Figure 1.

Prevention of preterm birth through prenatal care depends both on the woman's ability to get care and whether or not the preventive strategies outlined in Figure 1 are employed. Improving the quality of care, continuity and access to care and alleviating the economic

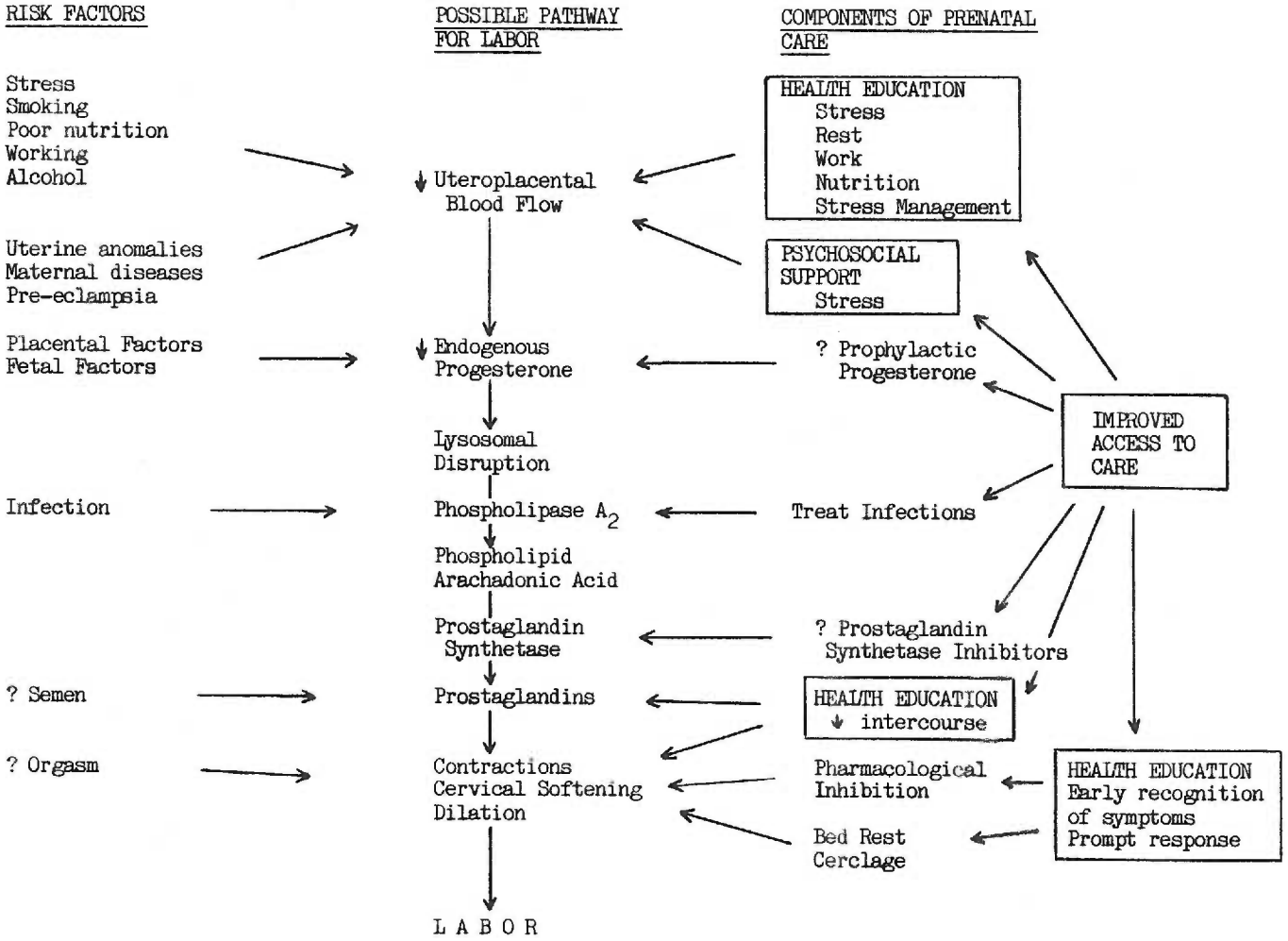
RISK FACTORS
POSSIBLE PATHWAY FOR LABOR
COMPONENTS OF PRENATAL CARE
Stress
Smoking
Poor nutrition
Working
Alcohol
Uterine anomalies
Maternal diseases
Pre-eclampsia
Placental Factors
Fetal Factors
Infection
? Semen
? Orgasm
Uteroplacental Blood Flow
Endogenous Progesterone
Lysosomal Disruption
Phospholipase A2
Phospholipid Arachadonic Acid
Prostaglandin Synthetase
Prostaglandins
Contractions
Cervical Softening
Dilation
L A B O R
HEALTH EDUCATION
Stress
Rest
Work
Nutrition
Stress Management
PSYCHOSOCIAL SUPPORT
Stress
? Prophylactic Progesterone
IMPROVED ACCESS TO CARE
Treat Infections
? Prostaglandin Synthetase Inhibitors
HEALTH EDUCATION
intercourse
Pharmacological Inhibition
Bed Rest
Cerclage
HEALTH EDUCATION
Early recognition of symptoms
Prompt response

Figure 1

burden associated with getting care are important first steps.

Once the client has access to high quality, consistent care, prevention of preterm birth may depend on the degree to which health promotion, education and psychosocial support are important elements of that care. Counselling the pregnant woman about smoking, work, rest, nutrition, emotional changes and stress reduction could theoretically alter maternal health practices and result in improved uteroplacental blood flow thus decreasing the likelihood of preterm birth. Unfortunately, as discussed in the review of literature, data to support this assumption are sparse. Most preterm birth intervention studies have focused on drug therapy rather than on health education or psychosocial support.

Based on the review of the literature and theoretical concepts about the initiation of labor before term it appears that a nursing approach to preterm birth prevention might be effective. This approach should explore the role of health education, psychosocial support and access to care in the prevention of preterm birth. Therefore, this study will test the following hypotheses:

1. Women who have delivered full term infants will be more likely to have received health education as part of their prenatal care than women of similar risk, age, and socioeconomic status who have delivered prematurely.

2. Women who have delivered full term infants will be more likely to have perceived their care provider as supportive than women of similar risk, age and socioeconomic status who have delivered

prematurely.

3. Women who have delivered full term infants are less likely to have encountered barriers to obtaining prenatal care than women of similar risk, age and socioeconomic status who have delivered prematurely.

CHAPTER II

METHODS

This study compared the prenatal care received by women who delivered prematurely with that of a similar group of women who delivered at term. The subjects and setting, study design and procedure and data collection instruments will be described.

Subjects and Setting

The subjects who comprise the preterm group (cases) were taken from the population of women who delivered single, live infants of less than 37 weeks gestation and whose infants were admitted to one of two regional Neonatal Intensive Care Units (NICU) in Portland, Oregon. The women delivered at various hospitals throughout Oregon and parts of Washington. The majority delivered at the hospital to which their infants were admitted. All of the mothers whose preterm infants were admitted to the NICU during a two month period comprised the sample pool of cases to minimize selection bias. A total of 140 preterm infants were admitted during the study period. Of these, 38 were excluded. The criteria for exclusion were: placenta previa, placenta abruptio, multiple pregnancy, congenital anomalies, non-English speaking women and those whose infants had died.

Mothers of single, live, healthy infants delivered after 37 weeks gestation whose size was appropriate for gestational age were selected for the control group. These women delivered in the same two hospitals to which the preterm infants had been admitted. The same criteria for exclusion were used. The control group was matched with the preterm group on the basis of age, socioeconomic status and

risk of preterm birth. Matching on age and socioeconomic status was done to maximize comparability of the two groups in terms of care-seeking behavior and health practices. Matching on risk of preterm labor minimized the effect of risk on outcome so that the effects of prenatal care in the two groups could be measured.

Design and Procedure

A case-control design, using retrospective data from a structured interview, was used. The mothers of preterm infants were considered cases and the mothers of full term infants were the controls.

The mothers of preterm infants were interviewed first. All of the preterm infants admitted to the NICU during a two month period were listed. After reviewing the medical records to determine eligibility a total of 102 eligible mothers were identified. Of these, 94 were contacted in one of three ways. Most of the women (73) were approached in the hospital either during their postpartum stay or when they visited the NICU. Consent to participate was obtained at that time (see Appendices A and B) and they were interviewed at that time. A second group of 10 women were not at the hospital and were contacted by telephone and a personal interview was arranged. A third group of 8 mothers lived out of the area and were unable to arrange a personal interview. They were contacted by telephone and interviewed over the phone at the same time. There were 11 women with no telephone. Attempts were made to contact them through message phone or by messages left in the NICU asking them to telephone the investigator for an interview. Three of these women were thus contacted and interviewed by phone. Of the 94 women contacted, 92 agreed to

participate. Every effort was made to interview the mothers as close to the time of delivery as possible.

All women were interviewed according to the Prenatal Care Survey (Appendix C) and the Risk of Preterm Labor (Appendix D) interview schedules. A total risk score was computed and the subjects were placed in a low, medium or high risk category on the basis of the risk score. The socioeconomic status score was also computed.

The control mothers were selected from the postpartum units of the same perinatal centers. They were similarly screened by chart review for eligibility. In order to control for type of interview, 11 full term mothers were randomly chosen and contacted and interviewed by telephone. The rest of the control group was approached in the hospital during their postpartum hospital stay and the same procedure followed as for the case mothers. All of the full term mothers contacted agreed to participate. After each interview, the full term mother was matched with a preterm mother as follows:

1. The risk categories were matched
2. The SES score was matched within five points
3. They were matched for age in the following categorie: Less than 18, 18-20, 21-30, 31-40, and greater than 40.

A total of 85 out of 92 mothers who delivered prematurely were individually matched in this manner with full term mothers. Seven of the preterm mothers could not be individually matched with a control. Therefore, they were matched with seven full term mothers as a group. Each group had the same number in each age, risk and SES category. Interviews with full term subjects who did not match with a preterm

subject were discarded.

Data Collection Instruments

Four data collection instruments were used. They were the Prenatal Care Survey (Appendix C), the Risk of Preterm Labor Score (Appendix D), the Green Index for Scoring Socioeconomic Status (Appendix E), and the Ballard Assessment of Gestational Age (Appendix F). Each instrument will be described in the context of the variables it measured. Medical records provided information on the infants' gestational age and health and the mothers' pregnancy.

Measurement of Independent Variables

The independent variables were receipt of health education, supportiveness of care and barriers to access to care. Information regarding these components of care were obtained through the Prenatal Care Survey. This structured interview consisted of 33 items developed by the researcher. Eighteen of the items were measured on a 7-point Likert scale. Thirteen were multiple choice and two were completion items. The schedule was reviewed by a panel of experts to determine content validity. After revision it was administered to a pilot group of new mothers and revised again before being used in the study. All of the interviews were done by the investigator.

Receipt of health education by the mother was defined as discussion of nutrition, weight gain, smoking, alcohol, drugs, physical activity, rest, working, emotional changes, sex, signs of labor, danger signs, WIC, and stress management with the health care provider during prenatal care. This variable was measured by question 9 of the Prenatal Care Survey. Subjects were asked whether or not the topic

was discussed. One point was given for each item discussed. Possible scores ranged from 0-14 with higher scores indicating receipt of more health education. As seen in Table 3, the Cronbach's alpha for this scale was 0.86 indicating that the scale was reliable.

Perceived supportiveness of care was defined as discussion of life stress, perception of provider as a source of emotional support, ability to have questions answered and to discuss personal problems with the provider, inclusion of patient's support system in care, feeling liked and respected by care provider and feeling that the care provider would help the patient solve problems. Data for this variable were collected from survey questions 25-33. Each of these questions were measured on a 7-point Likert scale. Possible scores range from 9-63, with higher scores signifying greater supportiveness. Relia-bility of the scale was 0.92 (Table 3).

Barriers to obtaining care were defined as problems with finances, transportation, childcare, treatment received and being refused care. This variable was measured by question 2 of the Prenatal Care Survey. Subjects were asked whether or not each issue was a problem for them. One point was scored for ech stated problem. Possible scores ranged form 0-5, with higher scores indicating greater barriers. As seen in Table 3, the reliability of this scale was 0.45.

Measurement of the Dependent Variable

The gestational age of the preterm and control infants was the dependent variable in this study and was assessed using the Ballard

Table 3

Reliability of Scales

Scale Name	No. of Items	Inter-item Mean	Sample Size	Cronbach's Alpha
Health Education Score	14	0.33	168	0.86
Perceived Supportiveness of Care Score	9	0.59	178	0.92
Barriers to Care Score	5	0.14	184	0.45
Problems During Pregnancy Score	8	0.27	185	0.75
Risk of Preterm Labor	21	0.02	139	0.24

(1977) scoring system routinely performed by nursery staff (Appendix F). The Ballard assessment of gestational age in newborn infants is based on 6 neuromuscular maturity and 7 physical maturity items. Scores range from 0-58, each score corresponding to a gestational age in weeks. The error of prediction of a single (total) score has been estimated as 1.02 weeks and the 95% confidence limits as + two weeks. This instrument has established reliability and validity.

Measurement of Control Variables

In this study, risk of preterm labor, socioeconomic status and age were the control variables.

Measurement of Risk of Preterm Labor

The Risk of Preterm Labor Score was calculated from responses to a verbal interview consisting of 32 questions based on a modification of Creasy's (1980) scoring system. It only included factors which could be assessed early in pregnancy when prenatal intervention strategies would be most effective. All of the items involving socioeconomic status, medical/obstetric history and life style were included. The items which were excluded were those which would not be obtainable by history at the first prenatal visit. The excluded items were factors in the current pregnancy as follows: weight gain by 26 weeks; albuminuria; hypertension; bacteriuria; breech; head engaged; effacement; dilation; uterine irritability; hydramnios; placenta previa; twins; and abdominal surgery. The possible scores ranged from 0 to 90. A total score of 0-5 places a woman at low risk, 6-9 at medium risk and 10 or more at high risk for preterm delivery. The incidence of preterm delivery in Creasy et al.'s (1980) study was 2%,

5% and 30% from the low, medium and high risk groups respectively. The high risk group contributed 64% of the preterm births. If the medium and high risk groups were considered together, the Risk of Preterm Labor instrument predicted approximately 80% of all preterm deliv-eries. The scores were assigned to women who were then followed prospectively, indicating criterion validity. Reliability of this instrument was not reported. Comparisons of validity and reliability in this present study cannot be made because the instrument was altered. Reliability of the Risk of Preterm Labor Score used in this study was 0.24 (Table 3).

Measurement of Socioeconomic Status.

The Green (1970) three factor index was used for scoring socioeconomic status (SES) because this index has been shown to be highly correlated with preventive health behavior such as prenatal care. Standardized scores were used to code the mother's education in number of years of school completed, gross family income and occupation of the main wage earner. The weighting of each of these factors and the computation of the score can be found in Appendix E.

Measurement of Other Variables

In order to better understand the data for the hypotheses, data on other variables were collected. These included: trimester of onset of prenatal care, number of visits, type of health provider, medical aspects of care, continuity of care, maternal problems during pregnancy, availability of social services, mode of payment for care and demographic characteristics. These data were also collected through the Prenatal Care Survey (Appendix C).

Maternal Problems during Pregnancy was defined as the mothers' experiencing stress, money problems, emotional problems, problems with their partner, family problems, work problems, housing problems or health problems during their pregnancies. This variable was measured by questions 11-18 of the Prenatal Care Survey (Appendix C). Each of the questions were measured on a 7-point Likert scale. Possible scores ranged from 8-56 with higher scores signifying more problems. Reliability of the scale was 0.75 (Table 3).

Analysis of Data

The statistical package for the social sciences (SPSS) was used as the computer program for this study. Tests of significance on distributions of variables measured on a nominal scale were done with Chi square. Interval data were analyzed by t-test. A complete analysis of data will be presented in the next chapter.

CHAPTER III

RESULTS

This chapter describes the findings of the study. A general description of the sample will be presented first followed by the findings relevant to each hypothesis. Presentation of other findings concludes the chapter.

Sample Description

Selected demographic characteristics of the sample are presented in Tables 4 and 5. The preterm mothers and full term mothers were similar in terms of age, gravidity, parity, education and socioeconomic status. They differed with regard to race and marital status, with a significantly higher proportion of full term mothers being non-white ($\chi^2 = 5.87$, $p<.05$) and single ($\chi^2 = 5.77$, $p<.05$).

The Green (1970) index for socioeconomic status yields a continuum of scores which in this sample ranged from 36-78. A score of less than 40 might describe a person on welfare with no occupation, an income under $5000 per year and with less than 10 years of schooling. A score between 40-49 might be assigned to a laborer or service worker with 9-11 years of schooling and a yearly income of $5000-9999. A score from 50-59 might describe a semiskilled or skilled worker with a high school diploma who earns $10,000-14,999 per year. A score of 60-69 might describe a clerical, sales or military person with either a high school education or some college and an income of $15,000-24,999 per year. A score of 70 or above would be obtained by a professional, technical or managerial worker who is a college graduate earning over $35,000 per year. Similar scores can be derived from various combinations of

Table 4

Comparison of Preterm and Full Term Mothers

on Selected Characteristics

Characteristic	Preterm (N = 92)	Full Term (N = 92)	Significance of Difference
Gravidity			
1	36(39.1%)[a]	25(27.2%)[a]	
2	21(22.8%)	31(33.8%)	
3	16(17.4%)	18(19.5%)	
4 or more	19(20.7%)	18(19.5%)	
Mean	2.3	2.6	N.S.[b]
S.D.	1.4	1.4	
Parity			
1	53(57.6%)[a]	39(42.4%)[a]	
2	19(20.7%	30(32.6%)	
3	14(15.2%)	13(14.1%)	
4 or more	6(6.5%)	10(10.9%)	
Mean	1.8	2.0	N.S.
S.D.	1.2	1.1	
Education in years			
Mean	12.6	12.6	N.S.
S.D.	2.2	2.4	
Range	8–19	9–24	
Marital Status			
Married	77(83.7%)	62(67.4%)	$\chi^2=5.77^*$
Single	15(16.3%)	30(32.6%)	
Race			
White	88(95.7%)	77(83.7%)	$\chi^2=5.87^*$
Non-white	4(4.3%)	15(16.3%)	

[a] Number (Percent)

[b] N.S. = Not statistically significant

* $.10<p<.05$, df = 1

Table 5

Comparison of Preterm and Full Term Mothers

on Age, Socioeconomic Status and Risk

Characteristic	Preterm (N = 92)	Full Term (N = 92)	Significance of Difference
Age			
Mean	25.4	25.3	N.S.[a]
S.D.	6.0	5.5	
Range	14–40	15–37	
Socioeconomic Status			
Mean	58.5	57.3	N.S.
S.D.	9.5	9.1	
Range	36–78	38–77	
Risk Category			
Low	31.5%	29.3%	N.S.
Medium	31.5%	33.7%	N.S.
High	37.0	37.0%	N.S.
Risk Score			
Mean	9.0	9.1	N.S.
S.D.	6.1	5.9	

[a] N.S. = Not statistically significant

education, occupation and income. Approximately two-thirds of the sample falls into a lower-middle or middle socio-economic status group.

As would be expected, due to the matching process, the two groups were comparable as to risk score with 37% of each group in the high risk category. The mean risk score was 9.0 for the preterm and 9.1 for the full term mothers. The medium and high risk categories combined accounted for approximately two-thirds of the sample. The distribution of the various risk factors will be described later in the section on Other Findings.

The onset of prenatal care and number of visits in each group is compared in Table 6. In both groups, a large proportion of the sample initiated prenatal care in the first trimester. The mean number of visits did differ significantly in the two groups, with preterm mothers making significantly fewer visits.

Hypotheses

This section describes the results related to each hypothesis.

Hypothesis 1

The first hypothesis states that women who have delivered full term infants will be more likely to have received health education as part of their prenatal care than women of similar risk, age and socioeconomic status who have delivered prematurely. Data for this hypothesis were provided by question 9 of the Prenatal Care Survey (Appendix C). This question consisted of 14 items which asked if selected areas of health education were discussed with the mothers by their prenatal care provider. One point was scored for each item discussed. The scores ranged from 0-14.

Table 6

Onset of Prenatal Care and Number of Visits

in Preterm and Full Term Mothers

Prenatal Care	Preterm (N = 92	Full Term (N = 92)	Significance of Difference
Onset of Prenatal Care			
First Trimester	73(83.9%)[a]	70(78.7%[a]	N.S.
Second Trimester	12(13.9%)	17(19.1%)	
Third Trimester	7(2.2%)	5(2.2%)	
Number of Visits			
Mean	8.1	14.4	t = -8.43***
S.D.	4.5	5.4	
Range	1-25	1-40	
No Prenatal Care	3(3.3%)	3(3.3%)	N.S.

[a] Number (Percent)

[b] N.S. = Not statistically significant

*** p<.001, df = 173

As mentioned earlier, the scale was reliable (Cronbach's alpha = .86).

The mean health education score for the full term mothers was 10.34, significantly higher than the 8.96 mean score of the preterm mothers ($t = -2.61$, $df = 176$, $p<.01$). Therefore, Hypothesis 1 was supported. Moreover, for every item, with the exception of discussion of working and discussion of sex during pregnancy, a higher percentage of full term mothers than preterm mothers reported discussing the item with their care provider (see Table 7). The items which yielded significant differences between the groups were discussion of needed foods, signs of labor and when to call and report them, and danger signs to watch for and report. Odds ratios were computed for each item and are presented in Table 7.

In order to estimate the risk ratio for a preterm birth associated with lack of prenatal health education, the health education scores were split at the median (10.92). Scores above the median were taken to signify adequate health education and scores below the median, inadequate health education. Clinically, this cutoff point seemed appropriate, as it represents discussion of at least 78% of the topics. The odds ratio was then computed. The contingency table for the effect of health education on preterm birth is presented in Table 8. It was found that women who received inadequate health education were 2.2 times as likely to deliver prematurely as women who received adequate health education.

Because the full term and preterm groups differed with respect to number of visits, race and marital status, stratification analysis was used to control for the possible confounding effects of these variables.

Table 7

Numbers of Preterm and Full Term Mothers Who Received Health Education Regarding Specific Topics

Health Education Topic	Numbers of Mothers		Chi Square	Odds Ratio[a]
	Preterm	Full Term		
Foods to eat	59	75	6.79**	2.7(1.3,5.5)
Weight gain	67	71	N.S.	1.2(0.6,2.4)
Smoking	77	82	N.S.	2.6(1.0,6.9)
Alcohol use	72	76	N.S.	1.6(0.7,3.5)
Drug use	70	77	N.S.	1.9(0.9,4.2)
Physical Activity	70	72	N.S.	1.1(0.8,2.3)
Rest	70	75	N.S.	1.6(0.7,3.4)
Working	55	53	N.S.	0.9(0.5,1.6)
Emotional changes	38	44	N.S.	1.3(0.7,2.3)
Sex	54	54	N.S.	1.0(0.5,1.8)
Signs of Labor	41	76	28.83***	6.5(3.2,13.4)
Danger signs	63	77	5.09*	2.6(1.2,5.6)
Relaxation/Stress Management	37	49	N.S.	1.7(0.9,3.1)
WIC, foodstamps	22	32	N.S.	1.7(0.9,3.2)

[a] Numbers in parentheses = 95% confidence intervals

[b] N.S. = Not statistically significant

*.01<p<.05, df=1 **.005<p<.01, df=1 ***p<.001, df=1

Table 8

Numbers of Preterm and Full Term Mothers

with Inadequate and Adequate Health Education[a]

Time of Birth	Health Education		Chi Square	Odds Ratio[b]
	Inadequate	Adequate		
Preterm	52	37		
			5.76*	2.2(1.2,4.0)
Full Term	35	54		
Total	87	91		

[a] Inadequate Health Education = Below median Health Education Score of 10.9, and Adequate Health Education = Above median Health Education Score of 10.9

[b] Numbers in parentheses = 95% confidence intervals

*.10<p<.05, df=1

Stratification analysis was also used to evaluate whether the relationship between inadequate health education and preterm birth varied over different levels of risk and socioeconomic status. The preterm and full term groups were stratified into the following categories: white/non-white/; married/single; low visits/high visits; low socioeconomic status/high socioeconomic status; and low/medium/high risk. Those in the "low visit" stratum had fewer than the median number of visits (10.4) while those in the "high visit" stratum had more than 10.4 visits. Socioeconomic status scores below the median (57.5) were taken to signify "lower socioeconomic status" and scores above the median "higher socioeconomic status." Within each stratum, the numbers of preterm and full term mothers receiving adequate and inadequate health education were compared and odds ratios were computed. These results are presented in Tables 9 and 10.

When the groups were stratified in this manner, the effects of inadequate health education on preterm birth remained significant for women of low socioeconomic status, married women and white women. The odds ratio remained between 1.6 and 2.6 for all strata, indicating that the increased risk for preterm delivery associated with inadequate health education may still remain. When preterm and full term mothers with the same number of visits were compared, the difference in health education scores were no longer statistically significant indicating that it may be the number of visits, rather than the health education which made the difference. It is also possible that being a full term mother resulted in a greater number of visits and therefore more health education, rather than the reverse.

Table 9

Effects of Health Education on Preterm Birth Stratifying by Number of Visits, Marital Status and Race

Stratum	Amount of Health Education	Numbers of Mothers Preterm (N=89)	Numbers of Mothers Full Term (N=89)	Chi Square	Odds Ratio
Low Visits				N.S.[c]	1.9(.7,5.2)
	Inadequate	43	9		
	Adequate	27	11		
High Visits				N.S.	2.0(.7,5.6)
	Inadequate	10	25		
	Adequate	9	44		
Married				4.29*	2.2(1.1,4.4)
	Inadequate	44	23		
	Adequate	32	39		
Single				N.S.	2.3(0.6-8.9)
	Inadequate	8	11		
	Adequate	5	16		
White[b]				7.94**	2.6(1.4,4.9)
	Inadequate	49	26		
	Adequate	36	50		

Note: Inadequate Health Education = Below median score of 10.9, Low visits = Below median number of visits of 10.4

[a] Numbers in parentheses = 95% confidence intervals

[b] Non-white sample size too small for analysis

[c] N.S. = Not satistically significant

*p<.05, df=1 **p<.01, df=1

Table 10

Effects of Health Education on Preterm Birth Stratifying by Risk and Socioeconomic Status

Stratum	Amount of Health Education	Numbers of Mothers		Chi Square	Odds Ratio
		Preterm (N-89)	Full Term (N-89)		
Lower SES				5.62*	2.2(1.0,4.9)
	Inadequate	26	21		
	Adequate	19	33		
Higher SES				N.S.[b]	2.2(0.9,5.4)
	Inadequate	26	24		
	Adequate	28	21		
Low Risk				N.S.	2.4(0.8,7.0)
	Inadequate	18	11		
	Adequate	11	16		
Medium Risk				N.S.	1.6(0.6,4.5)
	Inadequate	15	12		
	Adequate	14	18		
High Risk				N.S.	2.6(0.9-7.2)
	Inadequate	19	12		
	Adequate	12	20		

Note: Inadequate Health Education = Below median score of 10.9,
Lower SES = Below median Socioeconomic Status score of 57.5

[a] Numbers in parentheses = 95% confidence intervals

[b] Not statistically significant

*$p<.05$, df=1

The Mantel-Haenszel chi square test was used to test the overall significance of the association between inadequate health education and preterm birth while removing the influence of each of the confounding variables on this relationship. As summarized in Table 11, the overall effects of health education on preterm birth were still significant when socioeconomic status, risk, and marital status are controlled. When the number of visits was controlled, the association between inadequate health education and preterm birth approached but did not reach statistical significance (χ^2=3.36, .05<p<.10, df=1). Because of the small numbers of non-white women, the Mantel-Haenszel test was not done for race as a confounding variable. There was a statistically significant difference in health education among the white women.

Hypothesis 2

The second hypothesis stated that women who have delivered full term infants will be more likely to have perceived their health care provider as supportive than women of similar risk, age and socioeconomic status who have delivered prematurely. Data for this hypothesis were obtained from questions 25-33 of the Prenatal Care Survey. For each question, the women were asked to describe their feelings about their health care provider on a 7-point Likert scale. The values for each question were then added together to yield a Perceived Supportiveness of Care score. Scores ranged from 10-63, with higher values indicating greater perceived supportiveness of care. As stated earlier, the scale was reliable (Cronbach's alpha = 0.92).

Table 12 compares the preterm and full term mothers' perception of supportiveness of their care provider. The mean Supportiveness of Care

Table 11

Overall Effects of Health Education on Preterm Birth, Controlling for Several Variables

Variable Controlled	Mantel-Haenszel Chi Square	Significance of Difference
Number of Visits	3.36	$.05<p<.10$, df=1
Socioeconomic Status	6.28	$.01<p<.05$, df=1
Risk	6.34	$.01<p<.05$, df=1
Marital Status	7.35	$.005<p<.01$, df=1

Table 12

Mean Scores of Preterm and Full Term Mothers on

Perceived Supportiveness of Care Scale

Scale Item	Preterm N = 89 Mean(S.D.)	Full Term N = 89 Mean(S.D.)	t value
Asked about problems	2.62(2.06)	3.47(2.10)	-2.74**
Source of emotional support	4.10(2.13)	4.83(1.93)	-2.39**
Answered questions	5.56(1.73)	6.10(1.10)	-1.65
Felt comfortable	4.43(2.15)	4.94(2.02)	-2.49**
Spent enough time	5.48(1.79)	5.88(1.45)	-1.61
Included support system	4.62(2.03)	4.71(2.23)	-2.75**
Felt liked and respected	5.63(1.66)	6.10(1.11)	-0.28
Would help solve problems	4.63(2.18)	5.18(1.83)	-2.23*
Gave encouragement	5.25(1.81)	5.92(1.44)	-1.83*
Perceived Supportiveness of Care Score	42.32(14.03)	47.14(11.74)	-2.49**

*.10<p<.05,df=176

**.005<p<.01, df=176

score was significantly lower in the preterm group than in the full term group (42.32 versus 47.14, $t = -2.49$, $df = 176$, $p<.01$). Therefore, Hypothesis 2 was supported. The mean response to every quesion was higher in the full term group than in the preterm group. Six differences in means were statistically significant. However, the groups did not differ to a significant degree in feeling that questions were answered, that the provider spent sufficient time with them, and that the care provider liked and respected them. Both groups had high scores on these items.

In order to estimate the risk ratio for a preterm birth associated with a low degree of perceived support the Perceived Supportiveness of Care scores were split at the median (48.2). The odds ratio was computed for a low degree of support (scores below the median) as compared with a high degree of support (scores above the median). When the scores were dichotomized in this fashion, the difference between the preterm and full term mothers approached but did not reach statistical significance ($\chi^2 = 2.72$, $.05<p<.10$). However, because data were lost as a result of dichotomizing, the t-test on the mean scores may be a more accurate estimate. As previously reported, the mean Perceived Supportiveness of Care scores did differ significantly between the two groups. The contingency table for the effect of supportiveness of care on preterm birth is presented in Table 13. The odds ratio indicates a 1.7-fold increase in risk for women without a supportive care provider.

Because the full term and preterm groups differed with respect to number of visits, race and marital status, stratification analysis was used to control for the possible confounding effects of these variables.

Stratification analysis was also used to evaluate whether the relationship between low perceived supportiveness of care and preterm birth varied over different levels of risk and socioeconomic status. The preterm and full term groups were stratified in the same manner as previously described in the analysis for Hypothesis 1. Within each stratum, the numbers of preterm and full term mothers with low and high degrees of support were compared and odds ratios computed. These results are presented in Tables 14 and 15.

The increased risk of preterm delivery as estimated by the odds ratio, associated with absence of a supportive care provider held only for women with more than the median number of visits, women of low socioeconomic status, women of low and high risk, white women and married women. The differences in perceived supportiveness of care between the full term and preterm groups were statistically significant for high risk women, married women, and white women. These results are summarized in Table 16.

The Mantel-Haenszel chi square test was used to test the overall significance of the association between lack of a supportive care provider and preterm birth while removing the influence of each of the confounding variables on this relationship. As summarized in Table 13, the overall effects of supportiveness of care on preterm birth were still significant when socioeconomic status and marital status were controlled for but not when number of visits or risk were controlled. It appears that the number of visits rather than the supportiveness of care may have made the difference. It is also possible that being a full term mother resulted in a greater number of visits and therefore

Table 13

Numbers of Preterm and Full Term Mothers

by Degree of Supportiveness of Care Provider

Time of Birth	Degree of Support[a]		Chi Square	Odds Ratio[b]
	Low	High		
Preterm	51	38	2.72 df=1	1.7(0.9,3.1)
Full Term	39	50		
Total	90	88		

[a] Low degree of support = Below median Perceived Supportiveness of Care Score of 48.2, and High degree of support = Above median Perceived Supportiveness of Care Score of 48.2

[b] Numbers in Parentheses = 95% confidence intervals

Table 14

Effects of Supportiveness of Care on Preterm Birth, Stratifying by Number of Visits, Marital Status and Race

Stratum	Degree of Support	Numbers of Mothers: Preterm (N=89)	Numbers of Mothers: Full Term (N=89)	Chi Square	Odds Ratio[a]
Low Visits				N.S.[c]	0.8(0.3,2.3)
	Low	42	13		
	High	28	7		
High Visits				N.S.	1.7(0.6,4.7)
	Low	10	25		
	High	9	44		
Married				7.19**	2.7(1.3,5.4)
	Low	43	20		
	High	33	42		
Single				N.S.	1.5(0.4,6.0)
	Low	8	19		
	High	5	8		
White[b]				4.07*	2.0(1.1,3.8)
	Low	47	29		
	High	38	47		

Note: Low Support = Below median Perceived Supportiveness of Care Score of 48.2
Low Visits = Below median number of visits of 10.4

[a] Numbers in parentheses = 95% confidence intervals

[b] Non-white sample too small for analysis

[c] N.S. = Not statistically significant

* $.01 < p < .05$, df=1 ** $.005 < p < .01$, df=1

Table 15

Effects of Supportiveness of Care on Preterm Birth,

Stratifying by Socioeconomic Status and Risk

Stratum	Degree of Support	Numbers of Mothers Preterm (N=89)	Numbers of Mothers Full Term (N=89)	Chi Square	Odds Ratio[a]
Low SES				N.S.[b]	2.0(0.9,4.5)
	Low	30	28		
	High	15	26		
High SES				N.S.	1.4(0.6,3.5)
	Low	21	11		
	High	23	24		
Low Risk				N.S.	1.8(0.6,5.2)
	Low	17	12		
	High	12	15		
Medium Risk				N.S.	0.9(0.3,2.5)
	Low	12	13		
	High	17	17		
High Risk				3.75*	3.2(1.1,8.8)
	Low	22	14		
	High	9	18		

Note: Low Support = Below median Perceived Supportiveness of Care Score of 48.2
Low SES = Below median Socioeconomic Status Score of 57.5

[a] Numbers in parentheses = 95% confidence intervals

[b] N.S. = Not statistically significant

*.01<p<.05, df=1

Table 16

Overall Effects of Perceived Supportiveness of Care on Preterm Birth, Controlling for Several Variables

Variable Controlled	Mantel-Haenszel Chi Square	Significance of Difference
Number of Visits	0.23	N.S.[a]
Socioeconomic Status	4.31	$.01<p<.05$, df=1
Risk	3.21	$.05<p<.10$, df=1
Marital Status	5.40	$.01<p<.05$, df=1

[a] N.S. = Not statistically significant

more supportiveness of care rather than the reverse. Supportiveness of care seems to be most important in the high risk group but may not be associated with preterm birth for low and medium risk women.

Hypothesis 3

Hypothesis 3 states that women who have delivered at term are less likely to have encountered barriers to obtaining prenatal care than women of similar risk, age and socioeconomic status who have delivered prematurely. Data for this hypothesis were obtained from the six items of question 2 of the Prenatal Care Survey (Appendix C). Women were asked whether or not each item was a problem in terms of obtaining prenatal care. One point was given for each problem identified and a total Barriers to Care Score was computed. Scores ranged from 0-3. The reliability of this scale is marginal (Cronbach's alpha = 0.45).

As can be seen in Table 17, there were no significant differences in the responses of the two groups to individual items. The mean Barriers to Care scores were 0.34 and 0.26 for preterm and full term mothers respectively ($t = 0.79$, $df = 182$, $p = .22$). Therefore, Hypothesis 3 was rejected. A greater percentage of full term mothers reported having had no problems obtaining care than preterm mothers but this difference was not statistically significant. The odds ratio for the association between barriers to care and preterm birth was 1.8. Because of the lack of statistical significance of the overall association and the fact that the numbers of women experiencing barriers to care was too small to permit stratification, no further analysis of data for this hypothesis was conducted.

Table 17

Comparison of Preterm and Full Term Mothers with Regard to Barriers to Obtaining Prenatal Care

Barrier to Care	Numbers of Mothers		Chi Square	Odds Ratio[a]
	Preterm (N=92)	Full Term (N=92)		
Problems paying for care	15	11	N.S.[b]	1.3(0.6,3.)
Refused care by facility	1	5	N.S.	0.2(0.1,1.7)
Problems with transportation	4	4	N.S.	1.0(0.2,4.1)
Problems with childcare	0	0	N.S.	
Treatment at clinic or office	8	3	N.S.	2.8(0.7,10.9)
Experienced one or more barrier(s)	24	15	N.S.	1.8(0.9,3.7)
No barriers	68	77		

[a] Numbers in parentheses = 95% confidence intervals

[b] N.S. = Not statistically significant

Other Findings

This section describes other findings of this study not specifically related to the three hypotheses.

Table 18 compares the preterm and full term mothers on the basis of provider, setting, continuity of care, pattern of visits, medical care received and availability of social services. In both groups, a physician was the care provider for the majority of women. However, a significantly higher percentage of women in the full term group saw a nurse midwife or a nurse practitioner than in the preterm group (χ^2=7.19, df=1, p<.01). There were differences in the prenatal care setting between the two groups with a higher proportion of preterm women receiving care in a private practice and more full term women receiving care in a county prenatal clinic or university/hospital clinic (χ^2=9.48, df=1, p<.001).

A large proportion of women in both groups reported having had regular visits and having consistently seen the same care provider. More full term women reported that there was a social worker, counselor or public health nurse available to them. However, this difference was not statistically significant. In addition, there was no significant difference in the proportion of women in each group on the WIC program or on welfare.

The standard medical care received by the two groups is also compared in Table 18. Virtually all of the women in both groups reported that their weight, blood pressure, urine, fundal height and fetal heart tones were checked at each visit.

As seen in Table 19, the preterm mothers experienced significantly

Table 18

Comparison of Preterm and Full Term Mothers with Regard to Selected Characteristics of Prenatal Care

Characteristic	Number of Mothers		Chi Square
	Preterm	Full Term	
Provider (N=89)			7.19**
Doctor	80	62	
Nurse-midwife/ Nurse practitioner	7	20	
Other	2	7	
Setting (N=89)			9.48***
Private practice	66	40	
Clinic	19	36	
Other	4	13	
Continuity of Care (N=89)			N.S.[a]
Same provider	58	46	
Few in same practice	7	14	
Many providers	31	29	
Regular visits (N=89)	76	82	N.S.
Social services available (N=92)	32	44	N.S.
On WIC (N=92)	26	35	N.S.
On Welfare (N=92)	9	19	N.S.
Medical Care (N-89)			
Weight checked	88	87	N.S.
BP checked	89	88	N.S.
Urine checked	86	89	N.S.
Fundal Height	88	87	N.S.
Fetal Heart Tones	89	89	N.S.

Note: The chi-square statistic was based on a comparison of use by preterm and full term mothers of doctor as provider versus nurse-midwife/nurse practitioner and in setting of private practice versus clinic.

** $.005 < p < .01$, df=1 *** $p < .001$, df=1

[a] N.S. = Not statistically significant

Table 19

Comparison of Preterm and Full Term Mothers on Problems During Pregnancy

Item on Scale	Mean Score Preterm Mean (S.D.)	Full Term Mean (S.D.)	t value
Under stress	3.91(2.04)	3.54(1.90)	1.27
Money problems	3.33(2.47)	2.92(2.03)	1.21
Emotional problems	2.95(2.21)	2.37(1.76)	1.96
Partner problems	2.08(1.82)	2.16(1.83)	-0.32
Family problems	2.00(1.75)	2.10(1.72	-0.38
Work problems	2.30(2.05)	1.98(1.66)	1.19
Housing problems	1.69(1.53)	1.49(1.28)	0.94
Health problems	2.83(2.31)	2.21(1.73)	2.06*
Problems During Pregnancy Score	21.04(9.60)	18.80(8.64)	1.71*

*.01<p<0.05, df=182

more problems during pregnancy as determined by the Problems During Pregnancy Score ($t = 1.71$, $df=182$ $p<.05$). Differences in health problems contributed most to the differences in overall score. This scale consisted of eight items, each scored on a 7-point Likert scale. The women were asked to describe how much of a problem each of the items was for them during their pregnancies. The scale was reliable (Cronbach's alpha = 0.75).

Table 20 presents the percentage of women in each group exhibiting each specific risk factor. These factors are the components of the Risk of Preterm Labor Score (Appendix D) derived from the risking tool of Creasy et al. (1980). The only risk factor on which the two groups differed significantly was on previous experience of a second trimester abortion ($\chi^2 = 5.97$, $p<.05$).

Table 21 is a correlation matrix which presents the intercorrelations of several of the variables in this study. The significance of these correlations will be discussed in the next chapter.

Table 20

Comparison of Preterm and Full Term Mothers with Regard to Various Risk Factors

Risk Factor	Preterm (N=92)	Full Term (N=92)	Chi Square
Less than 60" tall	5	4	N.S.[c]
Weighs less than 100 lbs.	6	3	N.S.
Two or more children at home	21	19	N.S.
Worked during pregnancy	45	46	N.S.
Heavy work	18	29	N.S.
Long, tiring commute	4	5	N.S.
Less than 1 yr. since last birth	3	7	N.S.
One first trimester AB[a]	21	22	N.S.
Two or more first trimester AB's	6	8	N.S.
One second trimester AB	8	2	5.97*
History of pyelonephritis	9	19	N.S.
Cone biopsy	3	2	N.S.
Uterine anomaly	6	2	N.S.
DES exposure[b]	2	2	N.S.
Previous preterm delivery	12	8	N.S.
Fibroids	2	4	N.S.
Smoking	24	29	N.S.
Bleeding after 12 weeks	16	7	N.S.
Febrile illness	11	10	N.S.
Weight loss of 5 lbs.	13	17	N.S.

[a] AB = abortion or miscarriage [b] DES = Diethylstilbesterol

[c] N.S. = Not statistically significant *.01<p<.05, df=1

Table 21

Intercorrelation Among Major Study Variables

Variables	Barriers to Care	Health Education	Supportiveness of Care	Maternal Problems
Barriers to Care	—	-0.10	-0.12	0.27***
Health Education	—	—	0.35***	0.003
Supportiveness of Care	—	—	—	-0.15*
Risk	0.17**	0.03	-0.06	0.39***
Socioeconomic Status	-0.19**	0.02	0.23**	-0.26***
Number of visits	-0.20**	0.22**	0.34**	-0.07
Marital Status[a]	0.01	0.05	-0.23**	0.13*
Race[b]	-0.07	-0.17**	-0.23**	0.01

[a] If single [b] If non-white

*.01<p<.05 **.005<p<.01 ***p<.001

CHAPTER IV

DISCUSSION

The primary aim of this study was to investigate components of prenatal care which may play a role in prevention of preterm birth. Three hypotheses, each specifying a relationship between a specific component of care and outcome were tested. The specific components of care were receipt of health education, perceived supportiveness of care provider, and barriers to care. The study also examined other variables including onset of care, number of visits, provider, setting, problems during pregnancy and risk factors. This chapter discusses each of the hypotheses first and concludes with a discussion of other findings.

Hypothesis 1: Receipt of Health Education

This hypothesis stated that women who have delivered full term infants will be more likely to have received health education as part of their prenatal care than women of similar risk, age and socioeconomic status who have delivered prematurely. The findings of this study supported this hypothesis. The mothers of full term infants reported discussing a significantly larger proportion of topics with their care provider than the mothers of preterm infants. The two groups had similar levels of education and socioeconomic status and were of similar age—variables which might have influenced receipt of health education. The specific subjects in which full term mothers received significantly more instruction were foods to eat, signs of labor and danger signs.

No other study reviewed specifically examined the role of health education as a whole in preterm birth prevention. Some studies (Berry & Wiehl, 1942; Cameron & Graham, 1944; Donovan, 1977; Rush, 1982) examined

specific areas of health education and others examined overall prenatal programs in which the health education component of care was not specifically measured (Herron & Dulock, 1982; Herron et al. 1982; Kennedy, et al., 1982; Sokol et al., 1980; Warnyca et al., 1979).

As discussed in the Review of Literature, previous studies on the effects of nutrition counselling on preterm birth have not produced consistent results. In this study, full term mothers were significantly more likely to report having discussed what foods to eat during pregnancy with their care provider. However, no attempt was made to ascertain what specific advice was given or whether it was followed.

The most significant difference between the groups was in discussion of the signs of labor and when to call and report them. This finding is not unexpected. Routine prenatal care leaves the discussion of signs of labor for the last month of pregnancy when it is most applicable for the majority of women. Therefore, full term mothers would be expected to be more likely to have discussed this topic with their care providers. However, it may be important to introduce this topic earlier so that women threatening to go into labor prematurely would be aware of symptoms to watch for and report. Medical intervention could then be instituted earlier and the preterm birth averted. The study by Herron et al. (1982) emphasized patient education for high risk mothers regarding the signs and symptoms of preterm labor, how to palpate and time contractions and when to contact the care provider. The results of this present study estimate a 6.5-fold increase in risk of preterm birth associated with failure to discuss the signs of labor. This finding supports Herron et al.'s strategy of introduction of this

topic early in prenatal care.

Discussion of danger signs to watch for and report was also significantly more likely to have occurred in the full term group, with an estimated risk ratio of 2.6 for those who did not discuss them. Early reporting of signs of pre-eclampsia, for example, may have led to earlier intervention and prevention of sequellae.

All of the topics included in the Health Education score should ideally be discussed at the first or second prenatal visit. Since the majority of women in both groups initiated care in the first trimester, their care provider theoretically had the opportunity to discuss these items but in some instances did not. Whether or not these women changed their behavior on the basis of this discussion was not investigated in this study.

A small but significant correlation was found between number of visits and health education scores ($r = .22$, $p < .01$) indicating that the difference in health education between the full term and preterm mothers may be attributable to the fewer visits of the preterm mothers. Repeated exposure to health education may be important. Women with more visits may have been more likely to remember having discussed these items and to have retained the information. When the number of visits was controlled for, there was no significant difference in the health education scores of the preterm and full term women signifying that it is the number of visits which determines the amount of health education. This finding has implications for practice. For health education to have an impact, it may be necessary to discuss subjects repeatedly, over time. Women receiving inadequate health education are at increased risk

for preterm birth as estimated by the odds ratio, even when number of visits is controlled. Although this finding may be due to chance, the fact that the odds ratios in both visit categories are of the same order of magnitude and direction indicates that there is an association between inadequate health education and preterm birth. However, it is difficult to determine the causal ordering of events as it may have been the fact of being preterm and therefore having fewer visits which led to less health education rather than the reverse.

The overall association between inadequate health education and preterm held when socioeconomic status, risk and marital status were controlled indicating that the difference in education was not attributable to differential responses of health professionals to different categories of women. Rather, it appeared to be a consequence of the fewer visits of the preterm mothers due to fewer weeks of gestation. The study of Breart et al (1981) also found that women with more frequent visits had a lower percentage of preterm births.

The importance of health education in prenatal care, although generally agreed upon by practitioners, has never been systematically researched. The finding that significantly less discussion of various health education topics occurred in the preterm group in this study has major implications for preterm birth prevention. The fact that the differences were not significant after number of visits was controlled for may indicate a need for more prenatal visits earlier in pregnancy than is currently the standard of practice. These visits may not need to include the medical aspects of care but could conceivably be purely nursing visits to counsel women regarding the various aspects of health

promotion during pregnancy.

Hypothesis 2: Perceived Supportiveness of Provider

The second hypothesis tested in this study was that women who have delivered full term infants will be more likely to have perceived their health care provider as supportive than women of similar risk, age and socioeconomic status who have delivered prematurely. This hypothesis was supported by the findings of this study.

The full term group scored significantly higher on the Perceived Supportiveness of Care scale as well as in six of the nine individual items. The items which were most significant were: the provider asked about stress and problems in the woman's life, the perception by the woman that the provider was a source of emotional support, the woman feeling comfortable discussing her personal problems with the provider and the provider included her support system in her care.

The importance of social support during pregnancy has been investigated in terms of adaptation to parenthood, the woman's experience in labor and to some extent in relation to the complications of pregnancy. However, the specific role of the care provider as a source of support in preterm birth prevention has not been studied. Herron and Dulock (1982) emphasized the importance of the relationships between the patient and care provider in their Preterm Birth Prevention Program and Herron et al. (1982) speculate that it may have been the psychological support provided in weekly visits that made the difference in the reduction of preterm birth in their program. The findings of this present study confirm the importance of the care provider as a source of support in preterm birth prevention.

The women in this study did not report that their care providers asked them about stress and problems in their lives. The full term group scored significantly higher on this item but overall the mean score for this item was 2.62 for preterm and 3.47 for full term mothers on a scale of 1-7. Anecdotally, many women were surprised at the suggestion that they would look to their provider for emotional support or help with their personal problems. The findings of this study indicate that providers may potentially play an important role in prevention of preterm birth by providing support. Practitioners need to be made aware of this aspect of care and be encouraged to include questions about life stress in their history taking.

Women with a greater number of visits were more likely to perceive their care provider as supportive ($r = .34$, $p<.001$). It is likely that more contact time with the provider facilitated rapport and communication. The fact that when number of visits was controlled there was no statistically significant difference between the groups in presence or absence of a supportive care provider indicates the potential importance of more frequent nursing visits earlier in pregnancy. Again, the direction of causality is difficult to determine. It may have been the fewer visits of preterm women which led to their having been less likely to perceive their care provider as supportive rather than the lack of support resulting in preterm birth. In addition, the fact that the preterm women had an unfavorable outcome may have influenced their perception of the supportiveness of their care provider.

Lack of a supportive care provider seems to have had a greater impact on women of low socioeconomic status (odds ratio = 2.0). Perhaps

women of higher socioeconomic status had adequate outside support systems and did not need their practitioner to provide this support. Women of lower socioeconomic status had more problems during pregnancy ($r = .26$, $p<.001$) and may have had fewer resources. For these women, a supportive care provider may be especially important. In the sample as a whole, however, there was a correlation between higher socioeconomic status and perceived supportiveness of care ($r = .23$, $p<.01$), indicating that the women who needed more support were not as likely to get it.

The presence of a supportive care provider seemed to be especially important among high risk women (odds ratio = 3.1 for high risk women without a supportive provider). These women experienced significantly more problems during their pregnancies ($r = .39$, $p<.001$) and therefore were more likely to need support. However, in the sample as a whole, there was a negative correlation between problems during pregnancy and perceived supportiveness of the care provider ($r = -.15$, $p<.05$).

The absence of a supportive care provider also seemed to place married women at higher risk for preterm delivery (odds ratio = 2.7) than single women (odds ratio = 1.5). This finding may be related to the fact that there were relatively few single women in the preterm group ($N = 15$). Being single was negatively correlated with perceived supportiveness of the care provider ($r = -23$, $p<.01$), and positively correlated with problems during pregnancy ($r = .13$, $p<.05$).

It is disturbing to find that the women who needed the most support from their care provider, i.e. single women, high risk women, women of lower socioeconomic status and women experiencing greater difficulties during their pregnancies, were those least likely to receive it. This

finding indicates that as care providers, we may need to examine our biases and the types of women we are likely to be most supportive of.

Hypothesis 3: Barriers to Care

It was hypothesized that women who have delivered full term infants will be less likely to have encountered barriers to obtaining prenatal care than women who have delivered prematurely. This hypothesis was not supported by the findings of this study. However, the estimated odds ratio of 1.8 for women with problems obtaining care does indicate that these women are at a slightly greater risk of preterm birth.

Relatively few barriers to care were encountered in either group, with 78% of the sample reporting no barriers to care and only 3.3% receiving no prenatal care. This finding is probably related to the fact that the sample was predominantly of middle rather than low socioeconomic status. Higher socioeconomic status was negatively correlated with barriers to care. Another explanation is that the instrument used to measure barriers to care had low reliability (Cronbach's alpha = 0.45).

Other Findings

This sample was primarily Caucasian, married, with a high school education and of middle socioeconomic status. While this is fairly representative of the population of Oregon, this demographic profile of mothers of preterm infants differs from that found nationwide. In the United States in 1980, 28.6% of all preterm births were to Black mothers (National Center for Health Statistics, 1982). In this study, only 4.3% of the preterm mothers were non-White. Therefore, the results of this study may not be generalizable to a non-white, less educated lower

socioeconomic status population.

There was no difference between the preterm and full term mothers in the proportion lacking prenatal care or in the proportion initiating care in the first, second and third trimester, respectively. This finding differs from the results of several other studies (Chase, 1973; Eisner et al., 1979; Gibson & Colley, 1982; Kaltreider & Kohl, 1980; Sokol et al., 1980). A much larger proportion (81.3%) of women in this study initiated care in the first trimester than has previously been reported in the literature. However, according to national natality statistics, in 1980 76.3% of all births in the United States were to mothers who began care in the first trimester (National Center for Health Statistics, 1982). Therefore, the sample in this present study is representative of the nation as a whole with regard to onset of care. Some of the studies previously reviewed were of inner city, low socio-economic status women as compared with this sample which included women from all socioeconomic strata and rural as well as urban areas. In addition, some of the previous studies did not control for age, risk and socioeconomic status which might influence maternal care seeking behavior.

While early onset of prenatal care is clearly desirable, the results of this study indicate that it alone was not sufficient in preventing preterm birth. Once the woman accesses care in the first trimester, it is the content of the care which may be important. Furthermore, both groups in this study had comparable medical care with a greater proportion of preterm women obtaining care in a private physician's office. Therefore, it may be the nursing care, such as

health education and support which is important.

Although the time of entry into care was the same, the number of prenatal visits differed significantly between the groups. This finding was expected due to the longer length of gestation of the full term group. The number of visits was a confounding variable in the measurement of health education and perceived supportiveness of care. As previously discussed, more frequent visits may be an important aspect of care in preterm birth prevention. In the study by Herron et al. (1982) high risk women visited the nurse clinician every week rather than every four weeks which is currently the schedule for routine prenatal care.

An interesting finding of this study was that a significantly higher percentage of full term women saw a nurse midwife or nurse practitioner despite the fact that the two groups did not differ on risk status. The numbers who saw nurse practitioners or nurse midwives for care were small (N = 27) and therefore statistical analyses based on provider distinctions were not done. It would be interesting to examine whether or not the greater degree of health education and supportiveness of care reported by full term mothers was related to their increased utilization of nurse practitioners and midwives.

The preterm mothers experienced significantly more problems during their pregnancy than the full term mothers. These problems included stress, money problems, emotional problems, family problems, work, housing and health problems. This finding agrees with the results of the study by Newton et al. (1979) who found a higher incidence of major life events in the preterm group. However, because of the retrospective

nature of both studies, it is possible that the stress of having had a preterm birth influenced the mothers' recall of problems during their pregnancies. Maternal stress during pregnancy is possibly an important etiologic factor in preterm birth and should be further researched. The Risk of Preterm Labor instrument of Creasy et al. (1980) includes stress as it relates to low socioeconomic status, working, being a single parent and having two or more children at home, but does not specifically ask women about the level of stress in their lives. In this present study, the extent of problems during pregnancy was significantly correlated with risk score ($r = .39$, $p<.001$).

The instrument used to measure risk in this study was that developed by Creasy et al. (1980). Unfortunately, the internal consistency of this scale for this sample was poor (Cronbach's alpha = .24). The purpose of matching the groups by using this instrument was to improve the precision of the study rather than to draw conclusions based on the risk score or on any particular risk factors. Further research is needed to develop a risk tool which has validity and reliability. At present, Creasy et al.'s (1980) instrument is the only one available.

Summary

To summarize, the findings of this study indicate that the following components of prenatal care may play a role in prevention of preterm birth: health education, especially nutrition counselling, signs of labor and danger signs to watch for and report; supportiveness of the care provider; frequency of visits; and stress reduction. These results support the importance of a nursing approach in the prevention of preterm labor.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter includes a summary of the study followed by conclusions drawn from the data. Implications for nursing practice, limitations of the study and recommendations for future research will also be discussed.

Summary

Preterm birth remains a major cause of perinatal morbidity and mortality. Attempts to reduce the impact of this problem have, in the past, focused on pharmacological intervention and tertiary care of the neonate. The purpose of this case-control study was to identify components of prenatal care which are important in prevention of preterm birth.

The prenatal care received by 92 mothers of preterm infants and 92 mothers of full term infants was compared. The two groups were matched for age, socioeconomic status and risk of preterm birth. The aspects of prenatal care which were measured included health education, supportiveness of care provider and access to care. Three hypotheses were tested, each of which involved one of these specific aspects of care. These hypotheses were:

1. Women who have delivered full term infants will be more likely to have received health education as part of their prenatal care than women of similar risk, age, and socioeconomic status who have delivered prematurely.

2. Women who have delivered full term infants will be more likely to have perceived their care provider as supportive than women of

similar risk, age and socioeconomic status who have delivered prematurely.

3. Women who have delivered full term infants are less likely to have encountered barriers to obtaining prenatal care than women of similar risk, age and socioeconomic status who have delivered prematurely.

Demographic characteristics, provider, setting, maternal problems during pregnancy, onset of care and number of visits and medical aspects of care were also measured. Data were collected by structured interview.

The women in the sample were predominantly Caucasian, in their twenties, married and with a high school education. The socioeconomic status of the subjects varied with the largest proportion being of middle socioeconomic status. In terms of risk status for preterm birth the sample represented a fairly even distribution of low, medium and high risk women.

Conclusions

Two of the three hypotheses tested in this study were supported. Mothers of full term infants were more likely to have received health education as part of their prenatal care than women who delivered prematurely. Women who delivered full term infants were more likely to have perceived their care provider as supportive than women delivering prematurely. However, mothers of infants did not encounter fewer barriers to care than mothers of preterm infants.

Several conclusions can be drawn from the findings of this study. First, health education and support are components of prenatal care

which may be associated with the prevention of preterm birth. The majority of women in this study, in both the preterm and full term groups had early care and regular visits with a consistent care provider who routinely monitored blood pressure, weight gain, growth of the baby, urine samples and fetal heart tones. These components of care by themselves are not sufficient for preterm birth prevention. The finding that mothers of preterm infants received less health education and perceived their care providers as less supportive than mothers of full term infants suggests the importance of these two components of care. In this study, trimester of onset of prenatal care was not a significant factor in preterm birth but number of prenatal visits may have been. These results may indicate a need for more frequent prenatal visits earlier in pregnancy.

The differences between preterm and full term mothers' receipt of health education and perceived supportiveness of care were no longer statistically significant when the number of prenatal visits was controlled. Full term mothers had more visits and therefore may have had more opportunity to receive health education and support than preterm mothers. Although there appears to be an association between both lack of health education and lack of a supportive care provider and preterm birth, one cannot infer causality on the basis of this study.

Another conclusion of this study is that the preterm women experienced more problems during their pregnancies than full term women. These problems included stress, financial, emotional, family, work, housing and health problems. Although the role of maternal stress as an etiologic factor in preterm birth has not been sufficiently researched,

these data suggest a relationship.

The hypothesized relationship between barriers to care and preterm birth was not documented in this study. A very small precentage of women received no prenatal care. This finding does not lead to the conclusion that access to care has no relationship to preterm birth prevention but rather that a better tool for measuring access is needed.

Implications for Nursing Practice

The medical approach to prevention of preterm birth and its concentration on pharmacological intervention has not resulted in a significant reduction in the rate of prematurity. It is time for a nursing approach to the problem. The results of this study indicate the importance of health education and support in preterm birth prevention. Both of these components of care are inherent in the nursing role. Nurses in their roles as providers of prenatal care and childbirth educators need to emphasize these components of care early in pregnancy. Much of childbirth education centers around labor and delivery and has been initiated late in pregnancy. We need to find effective ways of reaching pregnant women early in their pregnancy, establishing a supportive relationship and providing health education.

Unfortunately, these aspects of prenatal care have not been given priority, especially in the current economic atmosphere. Nurses can have an impact politically in working towards establishment of programs which will include the nursing components of care as a priority. With data such as those provided by this study to back us up, we can lobby for these services.

Limitations of the Study

This study suffered from several limitations. These include sample size and characteristics, and the retrospective design and the data collection instruments.

The sample was small, consisting of only 184 women, and was not representative of the population at large. As previously discussed, the results cannot be generalizable to a non-white, lower socioeconomic status and less educated group.

The retrospective nature of the study is perhaps its greatest limitation. Women were asked to recall components of prenatal care and error due to passage of time can be expected, especially for preterm mothers recalling problems during pregnancy and the supportiveness of their care provider. All of the variables measured were based on recall with no attempt made to verify the data via medical records. The fact that the interviews were conducted by one interviewer eliminated the problem of inter-rater reliability. However, a bias was introduced in that the interviewer was the researcher and knew which group the women were in as well as the hypotheses being tested.

Another limitation was the data collection instruments that were used in this study. The Prenatal Care Survey had only face and content validity based on the literature and review by a panel of experts. Although the Health Education, Supportiveness of Care and Problems During Pregnancy scales did show good internal consistency, they may not be the most valid and reliable means of measuring the independent variables. The Health Education score was based only on whether or not the mothers remembered discussing certain topics with their care provider.

It did not address the issue of other sources of information, the nature of the advice given or whether or not it was followed. The Barriers to Care scale had poor reliability and may not have gotten at the needed information.

Recommendations for Future Research

Based on the findings of this study, there are many areas in need of further research. Prospective, randomized intervention studies are needed in which a specific program of health education is provided and evaluated. The study should control for number of visits, other sources of health education and measure not only whether the advice was given but whether it was absorbed and followed as well. In addition, each specific area of health education needs to be examined separately to determine which elements are most important.

Another important area for future research is the role of social support in preterm birth prevention, including the provider as a source of support as well as the woman's own network of support. Prospective, randomized intervention studies involving establishment of a supportive relationship between client and care provider are important but difficult to carry out.

The relationship between psychosocial stress and preterm birth is an area of great potential and much needed research. Personality, coping mechanisms and social support are likely to be important variables in determining the effect of stress on outcome.

Further research is needed to develop a reliable, valid risk tool. Prevention programs tend to concentrate efforts on a high risk population. In order to do so, it is necessary to be able to accurately

determine the population at risk. Creasy et al.'s (1980) Risk of Preterm Labor instrument may not have placed women in the appropriate risk cateogry.

More research is needed to determine what barriers to care exist and their impact on preterm birth. It would be unethical to assign women to a no-prenatal care group or not to provide care once a woman lacking it was identified. One way to approach the issue would be to make an all out effort in a community to provide high quality prenatal care to all pregnant women and compare preterm birth rates both before and after and with another community with similar demographic characteristics and larger numbers of women not receiving care.

The need for further research in the area of preterm birth prevention is enormous and at times overwhelming. This study has demonstrated that the focus of the research should be on specific components of prenatal care, especially health education, psychosocial support and stress reduction. Nurses can be in the forefront in conducting this type of research. In the meantime, we can use the results of this study to document the need for prenatal care which focuses on health education and support for pregnant women and to educate care providers in the importance of these components.

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APPENDIX A

Oregon Health Sciences University

Letter of Consent

Oregon Health Sciences University

Letter of Consent

You are invited to participate in a study entitled "Prevention of Preterm Birth: The Effects of Prenatal Care" conducted by Amy Shandell, R.N., Graduate Nursing Student under the direction of Dr. Mary Ann Curry. The purpose of the study is to explore the prevention of prematurity through prenatal care.

If you agree to participate, you will be interviewed by Amy Shandell, R.N. regarding your pregnancy and prenatal care. The interview will take approximately 20 minutes. All of the information you give will be confidential and your name will not appear on any of the data.

Your participation is not expected to involve any risk to you or your infant. You may refuse to participate, or withdraw from this study at any time without affecting your relationship with, or treatment at, the Oregon Health Sciences University. You will not be paid for participating in the study.

By participating in this study, you may help us to discover ways to prevent premature babies in the future. If you have any questions, please contact Amy Shandell, R.N. at 225-8382 or 239-6675.

Thank you.

Amy Shandell, R.N.

APPENDIX B

Emanuel Hospital Informed Consent

EMANUEL HOSPITAL

I,_____agree to participate in a study entitled "Prevention of Preterm Birth: The Effects of Prenatal Care" conducted by Amy Shandell, R.N., Graduate Nursing Student under the direction of Dr. Mary Ann Curry. The purpose of the study is to explore the prevention of prematurity through prenatal care.

I understand that I will be interviewed by Amy Shandell, R.N. concerning my pregnancy and prenatal care. The interview will take approximately 20 minutes. All of the information I give will be confidential and my name will not appear on any of the data.

My participation is not expected to involve ay risk to myself or to my baby. I may refuse to participate, or withdraw from the study at any time without affecting my relationship with, or treatment at Emanuel Hospital.

By participating in this study, I may help discover ways to prevent premature babies in the future. If I have any questions I understand that I may contact Amy Shandell, R.N. at 225-8382.

_____

Participant

_____

Date

_____

Witness

APPENDIX C

Prenatal Care Survey

PRENATAL CARE SURVEY

1. Did you receive health care during your pregnancy (prenatal care)?

   (1)_____yes (2)_____no

2. Did you have any of the following problems getting care?

   Please answer yes or no to each of the following:

   (1)_____Problems paying for care

   (2)_____Refused care because on welfare or could not pay

   (3)_____Problems with transportation

   (4)_____Problems with childcare

   (5)_____Problems with the clinic or office

   (6)_____Other (please explain)_____

3. Where did you receive prenatal care?

   (1)_____county prenatal clinic

   (2)_____private practice

   (3)_____university or hospital clinic

   (4)_____prepaid health plan (e.g. Kaiser)

   (5)_____neighborhood health center

   (6)_____other, describe_____

   (7)_____combination of_____

4. Who in that setting provided most of your care?

   (1)_____doctor

   (2)_____nurse midwife

   (3)_____nurse practitioner

   (4)_____lay midwife

   (5)_____chiropractor or naturopath

   (6)_____other, describe_____

   (7)_____combination of_____

5. During which month of pregnancy did you begin prenatal care?_____

6. How many times did you visit your health care provider?_____

7. Which of the following best describes your prenatal care?

   (1)_____I saw the same person throughout my pregnancy

   (2)_____I usually saw the same person but occasionally saw someone else

   (3)_____I saw a few people, in the same practice

   (4)_____I saw one person at first and then switched to another

   (5)_____I saw several different people

   (6)_____I rarely saw the same person twice

   (7)_____Other, describe_____

8. Which of the following best describes the pattern of your prenatal visits?

   (1)_____I had one visit to find out if I was pregnant

   (2)_____I had a few visits

   (3)_____I had some regular visits but missed a few

   (4)_____I had regular visits

   (5)_____Other, describe_____

9. Which of the following subjects were discussed with you by your health care provider during your prenatal care? (Answer yes or no)

   (1)_____Foods to eat during pregnancy

   (2)_____How much weight to gain during pregnancy

   (3)_____Smoking during pregnancy

   (4)_____Use of alcohol during pregnancy

   (5)_____Use of drugs during pregnancy

   (6)_____Exercise/physical activity during pregnancy

(7)_____Rest during pregnancy

(8)_____Working during pregnancy

(9)_____Emotional changes of pregnancy

(10)____Sex during pregnancy

(11)____Signs of labor and when to call and report them

(12)____Danger signs to watch for and report

(13)____Relaxation/stress management

(14)____Information about WIC, foodstamps, foodbanks

10. Which of the following were part of your prenatal care?

(1)_____My weight was checked every visit.

(2)_____My blood pressure was checked every visit

(3)_____My urine was tested every visit

(4)_____The growth of my baby was checked every visit

(5)_____My baby's heartbeat was checked every visit

For questions 11-19 please use this scale to best describe how much of a problem each item was for you during your pregnancy (copy of scale given to respondent)

	not at all	very little	a little	medium	a lot	quite a lot	a great deal
11. Stress	1	2	3	4	5	6	7
12. Money problems	1	2	3	4	5	6	7
13. Emotional problems	1	2	3	4	5	6	7
14. Problems with husband/ partner	1	2	3	4	5	6	7
15. Family problems	1	2	3	4	5	6	7
16. Work/Unemployment problems	1	2	3	4	5	6	7
17. Housing problems	1	2	3	4	5	6	7
18. Health problems	1	2	3	4	5	6	7
19. Other_____	1	2	3	4	5	6	7

20. During your pregnancy was a social worker, public health nurse or counselor available if you needed someone to help you with these problems?

(1)_____yes (2)_____no (3)_____don't know

21. Are you on the Women, Infants and Children (WIC) program?

(1)_____yes (2)_____no (3)_____no, but tried to get on

22. Do you receive food stamps?

(1)_____yes (2)_____no (3)_____no, but tried to get them

23. Are you on welfare?

(1)_____yes (2)_____no (3)_____no, but tried to get on

24. How are you paying for your prenatal care?

(1)_____savings/cash

(2)_____health insurance

(3)_____welfare

(4)_____combination of _____

(5)_____other, describe_____

(6)_____don't know how I'll pay

For questions 25-33, use this scale (copy of scale given to respondent) to best describe your feelings about your health care provider(s) during pregnancy. Please state who it is you are describing (e.g. doctor, nurse, midwife).

	not at all	very little	a little	moderately	a lot	quite a lot	a great deal
25. My___asked me about stress and problems in my life.	1	2	3	4	5	6	7
26. I felt that my___was a source of emotional support for me	1	2	3	4	5	6	7
27. I felt comfortable discussing my personal problems with my___	1	2	3	4	5	6	7

	not at all	very little	a little	moderately	a lot	quite a lot	a great deal
28. I usually felt that my questions were answered by my___	1	2	3	4	5	6	7
29. My___spent enough time with me to meet my needs	1	2	3	4	5	6	7
30. My___gave me encouragement and reassurance during my pregnancy	1	2	3	4	5	6	7
31. My___included my partner, husband, other family members or support people	1	2	3	4	5	6	7
32. I felt that my___ respected and liked me as a person	1	2	3	4	5	6	7
33. I felt that my___ would help me solve my problems	1	2	3	4	5	6	7

APPENDIX D

Risk of Preterm Labor Score

RISK OF PRETERM LABOR SCORE

Points Risk Factor

2....Younger than 20 years or older than 40 years
4....Younger than 18 years
3....Shorter than 60 inches
3....Lighter than 100 pounds
1....Two or more children at home
2....Single parent
1....Work outside home: Occupation_____
3....Heavy work (strenuous physical effort, standing, tension)
3....Long tiring commute
1....Less than one year since last birth
10....Previous preterm labor
10....Previous preterm delivery
1....1 first trimester abortion or miscarriages
2....2 first-trimester abortions or miscarriages
3....3 or more first-trimester abortions or miscarriages
5....1 second-trimester abortion or miscarriage
10....2 or more second-trimester abortions or miscarriages
4....History of pyelonephritis
5....Cone biopsy
5....Uterine anomaly
5....DES exposure
3....Fibroids
2....Smoker (more than 10 cigarettes per day)
3....Febrile illness
3....Bleeding after 12 weeks gestation
3....Weight loss of 5 pounds

Low Socioeconomic Status: Points are determined by the following criteria:

1....Items A or C
2....Items B or D, or A+C
3....Items A+D, B+C or B+D

A = Expectant Father is semiskilled laborer, laborer, student
B = Expectant Father is farm laborer or unemployed
C = Mothers education = 10-12 years
D = Mothers education = less than 10 years

How many years of school have you finished?
What is the father of the baby's occupation?_____
Is he employed?_____
Which of the following best describes your total family income during the past year?

(1)____under $5000
(2)____$5000-9999
(3)____$10,000-14,999
(4)____$15,000-24,999
(5)____$25,000-34,999
(6)____$35,000 or more

APPENDIX E

Method for Scoring Socioeconomic Status

Adapted from Green (1970)

Method for Scoring Socioeconomic Status,

Adapted from Green (1970)

Attribute	Score[a]
Years of school completed	
17+	73
16	66
15	63
14	61
13	60
12	53
11	48
10	46
9	44
8 or less	41
Occupation of main earner	
Professional/Technical	63
Managerial/Officials/Proprietors	59
Clerical/Sales	56
Craftsmen/Foremen/Skilled workers	52
Operatives/Semi-skilled workers	49
Service workers	46
Laborers	42
Farm Laborers	34
Members of the Armed Forces	53
No occupation/Welfare	20
Gross Annual Family Income	
Less than $5000	32
$5000-9999	46
$10,000-14,999	55
$15,000-25,999	62
$25,000-34,999	66
$35,000 or more	72

[a] Total Socioeconomic Status Score = 0.5 x Education Score +
0.3 x Income Score +
0.3 x Occupation Score

APPENDIX F

Ballard Assessment of Gestational Age

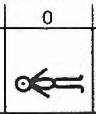
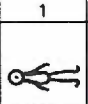
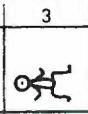
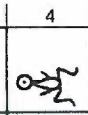
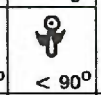
NEWBORN MATURITY RATING and CLASSIFICATION

ESTIMATION OF GESTATIONAL AGE BY MATURITY RATING

Side 1

Symbols: X - 1st Exam O - 2nd Exam

NEUROMUSCULAR MATURITY

	0	1	2	3	4	5
Posture						
Square Window (Wrist)	 90°	 60°	 45°	 30°	 0°	
Arm Recoil	 180°		 100°-180°	 90°-100°	 < 90°	
Popliteal Angle	 180°	 160°	 130°	 110°	 90°	 < 90°
Scarf Sign						
Heel to Ear						

PHYSICAL MATURITY

	0	1	2	3	4	5
SKIN	gelatinous red, trans-parent	smooth pink, visible veins	superficial peeling &/or rash, few veins	cracking pale area, rare veins	parchment, deep cracking, no vessels	leathery, cracked, wrinkled
LANUGO	none	abundant	thinning	bald areas	mostly bald	
PLANTAR CREASES	no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases cover entire sole	
BREAST	barely percept.	flat areola, no bud	stippled areola, 1–2 mm bud	raised areola, 3–4 mm bud	full areola, 5–10 mm bud	
EAR	pinna flat, stays folded	sl. curved pinna, soft with slow recoil	well-curv. pinna, soft but ready recoil	formed & firm with instant recoil	thick cartilage, ear stiff	
GENITALS Male	scrotum empty, no rugae		testes descend-ing, few rugae	testes down, good rugae	testes pendulous, deep rugae	
GENITALS Female	prominent clitoris & labia minora		majora & minora equally prominent	majora large, minora small	clitoris & minora completely covered	

Gestation by Dates _____ wks

Birth Date _____ Hour _____ am / pm

APGAR _____ 1 min _____ 5 min

MATURITY RATING

Score	Wks
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

SCORING SECTION

	1st Exam=X	2nd Exam=O
Estimating Gest Age by Maturity Rating	_____ Weeks	_____ Weeks
Time of Exam	Date _____ Hour _____ am / pm	Date _____ Hour _____ am / pm
Age at Exam	_____ Hours	_____ Hours
Signature of Examiner	_____ M.D.	_____ M.D.

Scoring system: Ballard JL, *et al*: A Simplified Assessment of Gestational Age, Pediatr Res 11:374, 1977. Figures adapted from "Classification of the Low-Birth-Weight Infant" by AY Sweet in Care of the High-Risk Infant by MH Klaus and AA Fanaroff, WB Saunders Co, Philadelphia, 1977, p. 47.

AN ABSTRACT OF THE THESIS OF

AMY SHANDELL

For the degree of MASTER OF NURSING

Date of Receiving this Degree: June 8, 1984

Title: PREVENTION OF PRETERM BIRTH: THE ROLE OF PRENATAL CARE

APPROVED: [redacted]
Mary Ann Curry, R.N., D.N.Sc., Thesis Advisor

The purpose of this case-control study was to identify components of prenatal care which are important in prevention of preterm birth.

The prenatal care received by 92 mothers of preterm infants and 92 mothers of full term infants was compared. The two groups were matched for age, socioeconomic status and risk of preterm birth. The aspects of prenatal care which were measured included health education, supportiveness of care provider and access to care. Data were collected by structured interview. Three hypotheses were tested, each of which involved one of these specific aspects of care. These hypotheses were:

1. Women who have delivered full term infants will be more likely to have received health education as part of their prenatal care than women of similar risk, age, and socioeconomic status who have delivered prematurely.

2. Women who have delivered full term infants will be more likely to have perceived their care provider as supportive than women of similar risk, age and socioeconomic status who have delivered prematurely.

3. Women who have delivered full term infants are less likely to

have encountered barriers to obtaining prenatal care than women of similar risk, age and scioeconomic status who have delivered prematurely.

The women in the sample were predominantly Caucasian, in their twenties, married and with a high school education. The socioeconomic status of the subjects varied with the largest proportion being of middle socioeconomic status. In terms of risk status for preterm birth the sample represented a fairly even distribution of low, medium and high risk women.

Two of the three hypotheses tested in this study were supported. Mothers of full term infants were more likely to have received health education as part of their prenatal care than women who delivered prematurely. Women who delivered full term infants were more likely to have perceived their care provider as supportive than women delivering prematurely. However, mothers of full term infants did not encounter fewer barriers to care than mothers of preterm infants.

The findings of this study indicate that health education and support are components of prenatal care which may be associated with the prevention of preterm birth. However, the differences between preterm and full term mothers' receipt of health education and perceived supportiveness of care were no longer statistically significant when the number of prenatal visits was controlled. Full term mothers had more visits and therefore may have had more opportunity to receive health education and support than preterm mothers. Although there appears to be an association between both lack of health education and lack of a supportive care provider and preterm birth, one cannot infer causality

on the basis of this study.

Another finding of this study is that the preterm women experienced more problems during their pregnancies than full term women. These problems included stress, financial, emotional, family, work, housing and health problems. Although the role of maternal stress as an etiologic factor in preterm birth has not been sufficiently researched, these data suggest a relationship.

The results of this study indicate the importance of health education and support in preterm birth prevention. Both of these components of care are inherent in the nursing role. We need to find effective ways of reaching pregnant women early in their pregnancy, establishing a supportive relationship and providing health education. Nurses can have an impact politically in working towards establishment of programs which will include the nursing components of care as a priority.

This study suffered from several limitations. The sample was small, consisting of only 184 women, and was not representative of the population at large. The results cannot be generalizable to a non-white, lower socioeconomic status and less educated group.

The retrospective nature of the study is another limitation. All of the variables measured were based on recall with no attempt made to verify the data via medical records. The interviews were conducted by one interviewer and therefore a bias was introduced in that the interviewer was the researcher and knew which group the women were in as well as the hypotheses being tested.

Another limitation was the data collection instruments that were

used in this study. The Prenatal Care Survey had only face and content validity based on the literature and review by a panel of experts.

This study has identified health education, supportiveness of care, and stress reduction as components of prenatal care which may be important in the prevention of preterm birth. Prospective, randomized intervention studies are needed to further evaluate the role of these components of prenatal care.

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