THE EFFECTS OF NURSING CASE MANAGEMENT ON THE UTILIZATION OF PRENATAL CARE BY PREGNANT MEXICAN AMERICAN WOMEN IN RURAL OREGON

By
Maye Thompson

A Dissertation

Presented to
Oregon Health Sciences University
School of Nursing
in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

March 13, 1997

THE EFFECTS OF NURSING CASE MANAGEMENT ON THE UTILIZATION OF PRENATAL CARE BY PREGNANT MEXICAN AMERICAN WOMEN IN RURAL OREGON

By
Maye L Thompson

A Dissertation

Presented to
Oregon Health Sciences University
School of Nursing
in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

March 13, 1997

APPROVED:

[redacted]

Mary Ann Curry, RN, DNSc, FAAN, Professor, Research Advisor

[redacted]

Darlene McKenzie, RN, PhD, Professor, Committee Member

[redacted]

Marie Napolitano, RN, PhD, FNP, Assistant Professor,
Committee Member

[redacted]

Kathleen M. Potempa, RN, DNSc, FAAN, Dean, School of Nursing

Acknowledgments

I would like to acknowledge the effort and expertise of the members of my dissertation committee: Mary Ann Curry, Darlene McKenzie, and Marie Napolitano. I would also like to thank the staff of the Office of Research Development and Utilization at the School of Nursing for their support and forbearance, and my fellow doctoral students for their friendly commiseration. A special thank you goes to my partner and best friend, Doug Allen, for his love and constant support as I stretch to fulfill my life's goals. And most of all, thank you to the women who participated in ROMPP, for their willingness to trust and share their lives with us. This dissertation would not exist without them.

ABSTRACT

TITLE: The Effects of Nursing Case Management on the Utilization of Prenatal Care by Pregnant Mexican American Women in Rural Oregon

AUTHOR: Maye Thompson

APPROVED: Mary Ann Curry
Mary Ann Curry, R.N., D.N.Sc., FAAN, Professor

This study evaluated the effectiveness of the Rural Oregon Minority Prenatal Program (ROMPP) in improving the patterns of prenatal care utilization by rural-dwelling, low-income Mexican American women at risk of poor pregnancy outcomes. ROMPP was a federally funded trial of an intervention to provide nursing case management services and peer outreach to pregnant Mexican American women in a rural Oregon community.

This quasi-experimental, retrospective study used birth certificate and medical record data to answer these questions: Did the women in the treatment group initiate prenatal care earlier in their pregnancies and have a more adequate number of visits than the comparison group? Were prenatal visits distributed throughout the pregnancies in a more appropriate way in the treatment group? Did the treatment group have fewer emergency room visits and fewer inpatient admissions during pregnancy? What were the diagnoses associated with these visits and admissions? When admitted, did the treatment group have shorter lengths of stay? Was the treatment group more likely to have screening serum glucose tests before 29 weeks of gestation?

The 100 women in the intervention group had a more appropriate distribution of prenatal visits, with more prenatal visits in months 2, 3, 4, 5, 6, and 7 than the comparison group ($p < 0.05$). The intervention group had a similar mean number of emergency room visits, but had more respiratory diagnoses and fewer urinary tract infections. ROMPP women had more inpatient admissions and longer lengths of stay, but the small number of hospitalizations precluded statistical inference. No statistically significant differences were found in the adequacy of initiation of prenatal care or the number of prenatal care visits as measured by Kotelchuck's (1994) Adequacy of Prenatal Care Utilization index, nor in the timing of screening serum glucose tests.

The intervention should be expanded to address the persistent attitudinal, financial, transportation and language barriers barriers to adequate prenatal care. Nurses should increase their cultural competency, and sharpen their clinical focus on advocacy, marketing, facilitation of relationships between community groups, and community organizing. The study is limited by the specificity of the setting, the time period, and the personnel. Yet as a field study, it has greater external validity than an experimental design might have.

TABLE OF CONTENTS

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

TABLE OF CONTENTS (con't)

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Early and adequate prenatal care is generally recognized as an effective means of reducing the incidence of low birthweight and other negative pregnancy outcomes. Low birthweight is the most significant predictor of infant mortality and morbidity. The Institute of Medicine (1988) has recommended that national policies be instituted to increase prenatal care participation by developing programs that address the multiple barriers to access of such care.

Low income people face significant barriers in access to health care, including prenatal care. Problems with distance and availability of care are greater for people dwelling in rural areas. Rural-dwelling, low-income racial and ethnic minorities, including Mexicans and Mexican Americans (hereafter collectively referred to as Mexican Americans, whether born in Mexico or in the U.S., and regardless of citizenship) face additional barriers to access, including language and cultural differences (Jasis, 1987; Quesada, 1976; Quesada and Heller, 1977).

This dissertation evaluates the effectiveness of the Rural Oregon Minority Prenatal Program (ROMPP) in improving the patterns of prenatal care utilization by rural-dwelling, low-income Mexican American women at risk of poor pregnancy outcomes. The ROMPP was a federally funded trial of an intervention to provide nursing case management services and peer outreach to pregnant Native American and Mexican American women in four rural Oregon communities. The goals of the intervention were to improve infant birth outcomes by: (a) providing prenatal home visits by a community health nurse; (b) improving assessment of maternal risk; (c) increasing social service referrals; and (d) improving client access to clinical prenatal care.

Public health nurses have traditionally promoted the health of mothers and infants by helping pregnant women gain access to prenatal care services. Indeed, the first organized prenatal care programs in the United States were begun by nurses in Boston and New York at the turn of the century (Thompson, Walsh, & Merkatz, 1990, p. 14). Recently, public health nursing leaders have advocated that nurses become more involved in the policy-making process at the institutional and societal levels (Salmon & Peoples-Sheps, 1989). Public health nurses have historically provided continuing, accessible, appropriate and accountable services to underserved and disenfranchised populations. Nurses have referred, brokered, and advocated on behalf of clients within the health care system on an ad-hoc basis, often without sanction or resources. Yet only recently have these activities been codified under the rubric of case management and received the attention of service delivery experts and policy makers. The nursing case management literature clamors for research on implementation, outcomes, and the cost-effectiveness of case management.

Maternal child nurses, nurse-midwives, pediatric nurse pracitioners, and neonatal nurses have published policy agendas which promote maternal and child health (Curry, 1987; Inglis, 1991; Swartz, 1990; Willis & Fullerton, 1991). A primary item on all of the agendas is universal access to prenatal care. Other recommendations include developing nursing services such as case management, targeting programs to high risk populations, implementing culturally relevant values and practices into services, and researching the effectiveness of nursing services.

This dissertation, an evaluation of the effectiveness of an innovative, culturally informed nursing intervention directed at an ethnic minority at increased risk of poor pregnancy outcomes, is congruent with the goals set by these agendas. The study contributes to the pool of outcome-based research, and to the knowledge nurses need to participate in the policy-making process.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

This literature review is organized in five sections. The first presents the correlates of birthweight in the U.S. population as a whole, and in Mexican Americans in particular. The next section explores the relationship between prenatal care and low birthweight. The third section presents the literature about barriers to prenatal care utilization among the population as a whole. Then the barriers to care encountered by Mexican Americans are presented in more detail, and cultural beliefs which may influence prenatal care utilization are explored. In the fourth section, programs designed to improve prenatal care utilization are reviewed. In the last section, the conceptual framework that guides the dissertation is presented, and the research questions are posed.

Correlates of Low Birthweight

One of the primary epidemiological indicators of a community's health status is the infant mortality rate. The major cause of infant mortality is low birthweight (2,500 grams or less) which is most often a result of premature birth or intrauterine growth retardation (Buehler, Strauss, Hogue, & Smith, 1987). There is significant personal and societal cost of low birthweight (LBW). In addition to an increased risk of dying, LBW infants are more likely to need intensive and costly medical services, and to have lifelong disabilities, than are infants born at normal birthweights. While many of the biological causes of LBW are unknown, it is thought that up to half of the cases may be preventable (National Commission to Prevent Infant Mortality, 1988).

There are many well-established and often collinear demographic, psychosocial, and biomedical correlates or predictors of LBW. Maternal demographic correlates include: nonwhite race; Hispanic or Native American ethnicity; age less than 18 years or greater than 35 years; single marital status; low income; less than high school education; and rural residence (Hughes & Rosenbaum, 1989; McDonald & Coburn, 1988; Swartz, 1990; Willis & Fullerton, 1991). Psychosocial factors include stressful life events and poor social support (Norbeck & Anderson, 1989), and difficult employment conditions (Willis & Fullerton, 1991). Behavioral predictors include the use and abuse of tobacco, alcohol, and/or drugs (Norbeck & Anderson, 1989; Willis & Fullerton, 1991). Biomedical predictors of LBW include: nulliparity or high multiparity; short interval between pregnancies

(Ernest, Michielutte, Meis, Moore, & Sharp, 1988); poor maternal weight gain, presumably associated with poor nutrition (Metcoff et al, 1985); pre-existing chronic disease such as diabetes or hypertension; history of complications with previous pregnancies (Ernest, Michielutte, Meis, Moore, & Sharp, 1988); multiple gestation; and premature labor (Willis & Fullerton, 1991).

Low Birthweight and Mexican Americans

The Mexican American population has characteristics that place it at higher risk for poor pregnancy outcomes than the population as a whole (Ventura & Taffel, 1985). As a group, Mexican Americans have lower incomes, lower levels of education, less health insurance, higher fertility with high parity and short birth intervals. In addition, they receive less health and prenatal care than their Anglo counterparts (Balcazar, Hartner, & Cole, 1993; Williams, Binkin, & Clingman, 1986).

Yet Becerra, Hogue, Atrash, and Perez (1991) report that in 1983 and 1984, the national rate of infant mortality for Mexican Americans and Anglos is the same; 8.3 per 1,000 live births. Despite similar risk characteristics, this rate is much lower than for African Americans at 17.2 deaths per

1,000 live births. The LBW rates parallel these figures: 4.7% for Anglos, 4.9% for Mexican Americans, and 11.5% for African Americans. And among Hispanics, Mexican-born women have a lower rate of LBW than do U.S.-born women of Mexican ancestry; 3.9 versus 5.5 respectively (Balcazar, Aoyama, & Cai, 1991). While the precise figures vary, this relationship is remarkably consistent from study to study (Balcazar, Cole, & Hartner, 1992; Balcazar, Hartner, & Cole, 1993; Becerra, Hogue, Atrash, & Perez, 1991; Guendelman, Gould, Hudes, & Eskenazi, 1990; Hahn, Mulinare, & Teutsch, 1992; Markides & Coreil, 1986; Scribner & Dwyer, 1989; Selby, Lee, Tuttle, & Loe, Jr., 1984; Ventura & Taffel, 1985; Williams, Binkin, & Clingman, 1986).

The low rate of infant mortality and LBW despite high risk factors among Mexican Americans is called the epidemiological paradox (Balcazar, Aoyama, & Cai, 1991). The paradox was first detected by epidemiologists in Texas in the early 1970s using data for Texas State Economic Areas (Teller & Clyburn, 1974, cited in Markides & Coreil, 1986). Later studies of birth and death certificate data confirmed these findings in Texas (Powell-Griner & Streck, 1982; Selby, Lee, Tuttle & Loe, Jr., 1984) California (Williams, Binkin & Clingman, 1986), Arizona (Balcazar, Hartner, & Cole, 1993), and Illinois (Collins, Jr. & Shay, 1994). The epidemiological paradox is apparent in national data as well, such as the 1980 National Natality Study (Ventura & Taffel, 1985), the 1982-84 Hispanic Health and Nutrition Examination Survey (Scribner & Dwyer, 1989), and the National Linked Birth and Infant Death data sets (Becerra, Hogue, Atrash, & Perez, 1991; Hahn, Mulinare, & Teutsch, 1992).

Several hypotheses have been advanced to explain the paradox. Mexican American women have lower rates of cigarette smoking (Ventura & Taffel, 1985) and alcohol consumption (Norbeck & Anderson, 1989) than the population as a whole. They have a greater average daily intake of calcium, iron, and food energy (Cobas, Balcazar, Benin, Keith, & Chong, 1996). Mexican American cultural values include pronatalist norms, approbation of pregnancy and motherhood (Scribner & Dwyer, 1989), strong family support (Williams, Binkin, & Clingman, 1986), and spiritual values that emphasize the collective good (Magaña & Clark, 1995). There are also strong norms prescribing marital fertility, especially for adolescents (Darabi & Ortiz, 1987). Other authors have posited selective immigration of healthy women (Guendelman, 1988; Markides & Coreil, 1986), and low rates of work force participation compared with the general population (Guendelman, 1988).

There are several concerns about the data upon which the paradoxical finding is based. In the case of infant mortality, there is evidence that migration to Mexico or to rural areas of the U.S. where vital registration is less complete result in an under-reporting of infant deaths (Selby, Lee, Tuttle, & Loe, 1984). In addition, the mobility of the Mexican American population may interfere with the mechanisms in vital statistics departments for forwarding death certificate data to the state in which the birth was registered. And infants who are born in the U.S. but die after they return to Mexico are not counted (Guendelman, 1994). Inconsistencies in coding race and ethnicity on birth and death certificates have been found (Hahn, Mulinare, & Teutsch, 1992). James (1993) presents the possibility that Mexican Americans more frequently give birth out of hospital, with subsequent under-registration of stillbirths and neonatal deaths.

Yet these findings do not explain the relatively low rate of LBW and prematurity (Markides & Coreil, 1986). Eberstein and Pol (1982) suggested that Mexican-born women might have a higher rate of undetected miscarriages, which may eliminate weaker fetuses. However, Guendelman, Gould, Hudes and Eskenazi (1990) were unable to confirm this hypothesis in the 1982 Hispanic Health and Nutrition Examination Survey data. In fact, evidence from California suggests that Hispanic (mostly Mexican American) women are less likely to have short-gestation still births, and more likely to have term stillbirths than non-Hispanic women (Guendelman, Chavez, & Christianson, 1994). While these contradictory findings make calculation of the precise magnitude of the paradox difficult, most analysts conclude that the paradox is real and not just an artifact of invalid data.

In Oregon, the epidemiological paradox holds for infant mortality. There is no significant difference between the infant mortality rate of foreign-born and U.S.-born Hispanic Oregonians (5.3%), and the state's population as a whole (5.25) (Oregon Health Division, 1995). According to the 1990

U.S. Census, 85% of Hispanic Oregonians are of Mexican heritage.

However, the paradox does not hold for LBW, as Hispanics in Oregon have a higher incidence of LBW than the state’s Anglo population. Compared to the state's non-Hispanic Anglo population, Hispanic Oregonians have a 30% higher incidence of preterm births (less than 37 weeks gestation), 8.3% versus 6.4%; and a 13% greater incidence of LBW, 54.3 per 1,000 births, versus 48.0 per 1,000. Furthermore, U.S.-born Hispanic mothers living in Oregon are more likely than foreign-born Hispanics to bear very-low birthweight infants, 1.3% versus 1.0%. Approximately 17% of Hispanic mothers, compared to 7% in the state, received inadequate prenatal care, and 2.1%, versus 0.9% for Caucasians, received no prenatal care at all (Oregon Health Division, 1993).

In summary, national data indicate that the rate of infant mortality and LBW among Mexican Americans resembles the rate among Anglos, despite the presence of characteristics which place them at greater risk. Yet in Oregon, Hispanics have a higher rate of preterm births and LBW than does the state's Anglo population. The differences in the state and national data point to the variation among the Mexican American population associated with geography and local conditions.

The high rate of preterm and LBW births among Hispanics has spurred Oregon policy makers to search for policies and programs to address the disparity. Much of the attention has focused on the relationship between LBW and prenatal care, for reasons that will be presented in the next section.

The Relationship Between Prenatal Care and Low Birthweight

Prenatal care appears to be related to the incidence of LBW. The positive effect of prenatal care on LBW is most apparent among full term infants (Alexander & Korenbrot, 1995). The nature of the relationship between birthweight and prenatal care is confounded by several factors. The same sociodemographic variables that predict LBW, such as nonwhite race, ethnicity, income, education, and rural residence, also correlate with the utilization, acceptability, and content of prenatal care. Further, studies about the adequacy of prenatal care have focused on the quantity of care received rather than on the content, quality, or acceptability of prenatal care (Buhang, 1992; Kogan, Alexander, Kotelchuck, & Nagey, 1994; Korenbrot, Simpson, & Phibbs, 1994; Peoples-Shep, Kalsbeek, & Siegel, 1988). This section of the literature review explores the sociodemographic variables associated with prenatal care utilization, content, and acceptability.

Demographic Variables Associated with Prenatal Care Utilization

Lower levels of utilization of prenatal care correlate with higher rates of LBW (Greenberg, 1983; Gortmaker, 1979; Korenbrot, Simpson, & Phibbs, 1994; Leveno, Cunningham, Roark, Nelson, & Williams, 1985; Showstack, Budetti, & Minkler, 1984). However, the demographic and sociocultural variables associated with LBW also apply to prenatal care utilization (Goldenberg, Patterson, & Freese, 1992; McDonald & Coburn, 1988). For instance, low-income, single women seek care later and have less care than do women with higher incomes (Mustard & Roos, 1994). And the association of increased prenatal care utilization with improved rates of LBW is especially apparent in low-income, black, single, rural, and adolescent women (Greenberg, 1983; Peoples & Siegel, 1983; Sardell, 1990).

Content of Prenatal Care

Prenatal care is a series of biomedical, psychosocial, and educational interventions administered at intervals throughout a pregnancy designed to improve the likelihood of a positive outcome for mother and baby (Nagey, 1989). Prenatal care can be conceptualized as having three components. The first is the screening, early detection, and prompt treatment of complications such as anemia, hypertension and threatened premature labor. For instance, the American College of Obstetricians and Gynecologists (1992) recommend that a screening test for gestational diabetes be done at 28 weeks of gestation. The second component is education, advice, and counseling about: (a) nutrition, physical activity, stress reduction, and other self-care measures; (b) avoidance of substances use/abuse; (c) sexual activity; and (d) signs and symptoms of pregnancy complications. The third component is social support to mitigate anxiety and buffer stress (Curry, 1990; Nagey, 1989).

There is little information about the relationship of birth outcomes to specific components or combination of components of prenatal care (Alexander & Korenbrot, 1995).

In one study, Kogan, Alexander, Kotelchuck, and Nagey (1994) explored the relationship between maternal reports of advice they received at prenatal care visits and the procedures that were performed at the first or second prenatal visit, and the rate of LBW. The study's authors used data from the 1988 National Maternal and Infant Health Survey. A total of 9,394 women who had a live singleton birth in 1988 responded to a mailed survey that asked about prenatal procedures including blood pressure measurement, urine culture, blood hemoglobin or hematocrit, and recording maternal height, weight, and health history. The survey also asked if during the course of their prenatal care respondents had received any advice or instructions regarding breastfeeding, reducing or eliminating alcohol, tobacco, and illegal drugs, eating the proper foods during pregnancy, taking prenatal vitamin supplements, and gaining an appropriate amount of weight during pregnancy. Questions were also asked about sociodemographic variables, prior obstetric history, tobacco use in the 12 months before delivery, and type of prenatal care provider. Birth certificate data were used to determine maternal age, parity, and infant birthweight.

There were no significant differences in the rate of LBW among women who reported having all the procedures preformed compared to women who reported that some procedures were not performed. But the LBW rate in the women who reported they had received advice in all seven categories listed above was 4.7%, versus 6.2% in the group that didn't recall receiving all of the advice ($p = 0.01$). The positive impact of advice appeared to be strongest in women with household incomes less than $6,000, primiparas, teenagers, hypertensives, inadequate users of prenatal care, women who received care at publicly funded sites, smokers, and women with a prior history of adverse birth outcomes. The effect of recalling having received all the advice remained after controlling for other known risk factors and for the quantity of prenatal care received.

The authors suggested several interpretations of their results. One is that health education and promotion may be a more critical element of good prenatal care than has been appreciated in the past. Another interpretation is that advice may be viewed as an expression of caring by the provider. Yet another interpretation is that women who are at higher risk for LBW infants may recall their prenatal experiences differently than other women.

There is evidence that disadvantaged women may receive care that does not include optimal content and is of lower quality than do more advantaged women. Hansell (1991) analyzed data from the National Natality Study and the Fetal Mortality Survey, which were both conducted in 1980. The data indicated that unmarried multiparous women who hadn't graduated from college were less likely to have received basic prenatal screening tests such as urine tests for protein, blood pressure checks, and hemoglobin and hematocrit measurements, than were married women with more education. The less advantaged women were also less likely to receive appropriate advice about salt restriction and use of diuretics than were more advantaged women.

In another study, Kogan, Kotelchuck, Alexander, and Johnson (1994) used the 1988 National Maternal and Infant Health Survey data. They found that more than one third of the women surveyed reported receiving no prenatal advice on alcohol, drug, or tobacco use, and about 50% couldn't recall being advised about breastfeeding. After controlling for age, marital status, education, income, type of payment, use of alcohol and cigarettes, trimester that care began, and prior adverse pregnancy outcomes, disparities in the prenatal care advice reported by the respondents were apparent.

African American women were significantly less likely than Anglo women to recall receiving advice about alcohol and drug use, and their recall of not receiving advice about breastfeeding approached statistical significance. Poorer women were more likely to recall receiving advice about smoking and drug use, and wealthier women were more likely to recall advice about alcohol use and breastfeeding. Older women were less likely to recall receiving advice about alcohol, drug, and tobacco use. Receiving advice about drug use was more common among clients at publicly funded sites and at hospital clinics than for patients in private offices. Clients at HMOs and publicly funded sites were more likely to recall receiving advice about breastfeeding compared to clients in private offices. Finally, WIC participants recalled receiving more advice on all topics than did non-WIC participants. This result is most likely explained by the fact that WIC recipients participate in additional educational programs as a condition for receiving food assistance.

The authors suggested that there is room for improvement in the educational content of prenatal care. Advice may be given on the basis of stereotypes about who engages in certain behaviors. Likewise, providers may neglect to give messages about changing health habits if they believe that such messages may be ineffective.

The study was based on self-report data, and women may have varied in their recall of advice according to type of advice, site of prenatal care, race, birth outcome, or other factors. Yet ultimately it is the woman's perception of what she is told that is most likely to be linked to changes in health behaviors.

No empirical studies were located in the literature which addressed the demographic correlates or the consequences for birth outcome of the timing of various aspects of prenatal care content over the course of pregnancy. Issues of interest include such questions as when advice is given and when screening procedures are done. The current study explored the appropriate timing of screening glucose tolerance tests among women who received the ROMPP intervention and women who did not.

Acceptability of Prenatal Care

There exists very little literature about what factors influence the acceptability of prenatal care to the pregnant client. Nor is there much literature about patient satisfaction with prenatal care services.

Acceptability is a function of the congruence between the pregnant woman's preferences and expectations and what prenatal care is able to offer. Convenience, accessibility, and affordability have been identified as important factors influencing the acceptability of prenatal care (Curry, 1987). The social and cultural milieu in which prenatal care services are offered is also important. Providers who demonstrate a courteous, caring attitude, who are sensitive and respectful of social and cultural differences, and are able to communicate effectively create a welcoming and comfortable atmosphere for the pregnant woman. Ideally, they establish a rapport that promotes the patient's commitment to continuing participation in prenatal care.

Oakley (1991) studied 247 pregnant women with a previous history of poor pregnancy outcome. She found that the working class women in the sample had substantially longer clinic waits, and were more dissatisfied with their inpatient care than were the middle class women in the study, who received their pregnancy care in the same facilities.

Adequacy of Prenatal Care

Most research about adequacy of prenatal care has focused on the quantity of care received, i.e utilization, rather than quality. The adequacy of prenatal care is most often defined in terms of two dimensions of utilization: (a) when during pregnancy prenatal care is initiated; and (b) the total number of prenatal visits during pregnancy.

A simple count of the number of prenatal visits is an inadequate measure of adequacy for two reasons. The first is that women who give birth prematurely will have fewer visits than women with full-term pregnancies. To ameliorate this effect, Mustard and Roos (1994) recommend using an index which takes into consideration the length of gestation. Second, women who experience complications early in pregnancy will have more visits than healthy women. Thus, the presence of prenatal biomedical risks and complications must be considered as a control or covariate variable (Mustard & Roos, 1994).

In the current literature, there are three extant indexes which measure the adequacy of prenatal care. The most commonly used measure is the Kessner index (Kessner, Singer, Kalk, & Schlesinger, 1973), which categorizes the quantity of prenatal care received as adequate, inadequate, or intermediate by considering the trimester in which care was initiated, the number of visits, the source of care (public or private), and gestational age at delivery. Most studies using the Kessner index have eliminated the source of care variable, which didn't explain any variance in the measure.

The second index was proposed by Alexander & Cornely (1987). They altered the taxonomic criteria of the Kessner index to create the GINDEX. The index has six categories of care: No care; Inadequate care; Intermediate care; Adequate care; Intensive care, and Missing/Unknown. They present evidence that the GINDEX is more predictive of LBW and neonatal mortality than the Kessner index.

The third index, Kotelchuck's (1994a) Adequacy of Prenatal Care Utilization Index (APNCU), has two dimensions:

(a) the Adequacy of Initiation, defined by month of initiation of care; and (b) the Adequacy of Received Services, defined as the proportion of total number of prenatal visits compared to the number of visits recommended by the American College of Obstetrics and Gynecology (1992), adjusted for gestational age at birth and the month when prenatal care was initiated. The index classifies care into four categories: Inadequate, Intermediate; Adequate; and Adequate Plus.

Kotelchuck (1994b) presents evidence that the APNCU is more predictive of LBW than is the Kessner index. Its dual dimensions can provide the means to test the notion that recruiting women into prenatal care and then retaining them within the system are two different problems, each with distinct policy and practice issues. The other two indexes do not separate the two dimensions (Wise, 1994).

<u>Studies relating LBW to the adequacy of prenatal care in the Mexican American population</u>. Three studies were located which relate the utilization of prenatal care to the incidence of LBW in the Mexican or Mexican American populations. The first of these three studies was conducted using retrospective data on 1,395 singleton hospital births

to healthy women who had received at least one prenatal care visit in Mexico City in 1984 (Coria-Soto, Bobadilla, & Notzon, 1996). The study explored the relationship of the content and quantity of prenatal care to the incidence of preterm delivery and intrauterine growth retardation (IUGR). The study measured adequacy of prenatal care with the Kessner index. Thirty-two percent of the women in the population from which the sample was drawn had adequate prenatal care, 50% had intermediate prenatal care, and 19% had inadequate care. The content of prenatal care was assessed according to whether six procedures had been performed: measurement of blood pressure, height, and weight; urine and blood testing; and a pelvic exam. Seventy-four percent of the women in the population had care with good content, and 26% had care with poor content.

The analysis controlled factors such as maternal age, marital status, education, parity, history of LBW infant, and maternal weight and height. The study did not control for cigarette smoking because the pilot study found that less than 8% of the women smoked at at all, and 80% of those that did smoked less than five cigarettes per week.

Women who had inadequate prenatal care were 63% more likely to have an infant with IUGR, and 51% more likely to have a preterm delivery than women with adequate prenatal care. The content of care had no statistically significant relationship with IUGR, but did influence the incidence of preterm delivery. Mothers who had poor content of prenatal care where 76% more likely to deliver a preterm infant than mothers judged to have good content. The authors noted that the study did not assess the content of each visit, and suggested that future studies look at procedures which are performed serially, such as measurement of maternal weight, fundal height and blood pressure (p. 19).

The other two studies examining the relationship between the utilization of prenatal care and LBW were unpublished masters theses conducted in Oregon. Both used sampled medical records in rural clinics which serve large numbers of migrant and seasonal farmworkers.

The first study randomly sampled women who received prenatal care at a rural clinic in Marion County, Oregon and had deliveries during 1985 and 1986 (Ferreira, 1988). Marion County has the largest concentration of Hispanics in the state of Oregon. Prenatal care at this clinic was provided by certified nurse midwives during the study period.

There were 261 births occuring during the study period, but there was missing data in the medical records of 66 of these women, so there were 195 women in the final sample. The author found that approximately 27% of the women started prenatal care in the first trimester. The mean number of visits was 9.20 ± 4.03. Using the Kessner index to assess adequacy of care, 24% of the women received adequate care, 53% had intermediate care, and 22% had inadequate care. The incidence of LBW was 6.67%, or 13 LBW babies, during the study period.

This study found no relationship between prenatal care utilization and LBW. Teens, nulliparas, and U.S.-born women were slightly more likely to have a LBW baby, a finding congruent with national data. The study was limited by a small sample size and clinical sample.

The second study used a case-control design to examine the relationship between prenatal care and LBW among babies born to women who received prenatal care at a clinic in Washington County, Oregon between 1987 and 1993 (Southgate, 1993). Washington County is on the fringe of the Portland metropolitan area, but has a significant rural area on its western edge. The incidence of LBW in this clinic's population was 6.8% in 1990. Prematurity was more prevalent than IUGR. The cases were the 41 LBW babies born during the sample period. Ninety-two controls with normal birthweights during the same time period were selected randomly from clinic records. All births were singleton pregnancies.

The author found that cases were less likely to have had inadequate prenatal care, as measured by the Kessner index. After adjusting for covariates, five characteristics predicted LBW: higher biomedical risk scores, very low income, inadequate weight gain during pregnancy, less than five prenatal visits, and one parent employed in seasonal agriculture. Like the previous study, this study was also limited by its small sample size and clinical sample.

Of these three studies, only the Mexico City study found an association between prenatal care utilization and LBW due to prematurity and IUGR. Compared to the two Oregon studies, the Mexico City study had a large sample size and more statistical power to find a correlation.

Gaps in the Literature About the Adequacy of Prenatal Care Utilization

This section identifies three gaps in the utilization literature. First, there is a dearth of studies about the distribution of prenatal care visits, and the utilization of other health care services during pregnancy, specifically emergency room and inpatient services.

None of the indexes reviewed above measures the appropriate distribution of prenatal visits throughout pregnancy. The current guidelines of the American College of Obstetricians and Gynecologists suggest care beginning as early in the first trimester as possible, with additional visits every four weeks for the first 28 weeks of pregnancy, every two to three weeks for the next eight weeks, and weekly from 36 weeks until delivery. The goal is to continuously monitor the progress of the pregnancy, promptly detect and treat complications, and provide multiple opportunities to inform, teach, counsel, and provide social support.

Only one study was located which addresses the issue of distribution of prenatal care visits during pregnancy. Kogan, Kotelchuck, and Johnson (1993) used the 1986

Massachusetts Prenatal Care Survey (MPCS) to explore racial disparities in the timing of prenatal care visits. The MPCS drew its sample from the population of women in Massachusetts who had a singleton birth in July, August, or September of 1985. The study included all the women in the population who had inadequate prenatal care as assessed by the Kessner Index, and 10% of the women who had adequate prenatal care. Hispanic and Asian women were eliminated from the sample because of small numbers. With a response rate of 84%, the final sample size was 2,587.

A combination of mail, phone, and personal visits were used to obtain completed surveys. The survey asked questions about race, age, marital status, education, source of care, type of health insurance, timing of prenatal care visits, barriers to prenatal care, and sources of social support. Survey information was linked to the birth certificate, which provided data on the normal menstrual period, and was used to calculate gestational age.

After controlling for sociodemographic variables and self-reported barriers to care, Anglo women had significantly more visits than African American women during the final two months of pregnancy (one-tailed $p < 0.01$), even after controlling for the greater rate of premature delivery in the African American sample. African American women reported 4.7 visits in the eighth and ninth month of pregnancy, compared to 5.5 visits for Anglo women. Racial differences in late prenatal care remained after controlling for site of care, type of health insurance, care, education, and emotional support from the father (one-tailed p < .01). There were no differences between the two groups in the number of visits during the first seven months of pregnancy. The authors pointed out that the study's findings were limited by the problems inherent in data generated recalled retrospectively by maternal self-report.

The authors noted that the educational and counseling content of visits around the end of pregnancy emphasizes preparation for labor and delivery, breastfeeding, and infant care. Also, medical complications such as hypertension, preeclampsia, and toxemia are more likely to occur in the final months of pregnancy. Fewer visits at the end of pregnancy may mean that there is less opportunity to intervene effectively and be a factor in the increased prevalence of adverse birth outcomes among African American women.

No literature was located which addressed patterns of distribution of prenatal visits in Mexican American women. The clinical experience of this author with Mexican American farmworkers in central California, suggests that Mexican American women may initiate prenatal care relatively early to confirm a normal pregnancy and obtain prenatal vitamins. They may not return for care until late in the third trimester, in response to concerns about a specific worrisome symptom, a desire to confirm their due date, or a request to sign an application for maternal disability leave. The current study determines if there are any differences in the distribution of prenatal visits throughout pregnancy between women who received the ROMPP intervention, and those who did not.

A second gap in the literature about utilization is the lack of information about emergency room utilization during pregnancy. Pregnant women may seek nonemergent pregnancy or nonpregnancy-related care at a hospital emergency room rather than at a regular provider's office or clinic. Common reasons for nonemergent ER visits are upper respiratory infection, urinary tract infection, and mild gastrointestinal disturbances. Such visits are more common among those who have no regular source of health care, and are more costly to the client and the system as a whole than care provided by a regular primary care provider in a private office or clinic. No studies were located which explored emergency room utilization by pregnant women. The current study explores differences in emergency room utilization among pregnant women who received the ROMPP intervention and those who did not.

A third aspect of health care utilization which has received little attention in the literature is the relationship of prenatal care to prenatal inpatient admissions. Prenatal inpatient admissions may be for pregnancy-related or nonpregnancy-related diagnoses. The most common pregnancy-related reason for inpatient admission is premature labor. One might expect that adequate prenatal care would correlate with fewer hospital admissions, since regular and timely prenatal care may result in early recognition and treatment of pregnancy complications. On the other hand, women with adequate prenatal care may have more hospital admissions because they have more contact with the health care system and more opportunities to be diagnosed with conditions that require inpatient management. The current study compares the number of prenatal inpatient admissions of the treatment and control groups.

Summary of the Literature About Prenatal Care and Low Birthweight

Because correlation cannot demonstrate causation, the question arises whether prenatal care is associated with improved birthweight because it is an effective intervention, or because women who get adequate prenatal care are more likely to be motivated to seek prenatal care, to live in favorable social environments, and to take better care of themselves. Does prenatal care prevent LBW, or are pregnant women who get adequate prenatal care less likely to have LBW babies anyway?

While this is a critical question to answer given the widespread acceptance of prenatal care, a randomized clinical trial is neither feasible nor ethical. Thus it is impossible to design a experimental study that would definitively prove a causal link between prenatal care and birthweight. In quasi-experimental designs, obtaining comparable treatment and comparison groups is difficult (Peoples-Shep, Kalsbeek, & Siegel, 1988). Selection bias, which confounds the effects of motivation, resources, and access, is virtually unavoidable (Huntington & Connell, 1994).

The episodic nature of pregnancy and prenatal care also contribute to methodological problems. For example, women who begin prenatal care at 38 weeks of pregnancy cannot have a premature delivery at 32 weeks, which artificially lowers the association between late onset of care and risk of preterm delivery (Gordis, Kleinmen, Klerman, Mullen, & Paneth, 1990). Also, prenatal care is most likely to benefit pregnant women with complications or pre-exisiting illness. There is a relatively small proportion of pregnancy complications that appear before the third trimester. These facts make it difficult to establish the efficacy of prenatal care in women who deliver very prematurely (Tyson, Guzick, Rosenfeld, Lasky, Gant, Jiminez, & Heartwell, 1990).

The literature emphasizes the quantitative adequacy of prenatal care utilization. There is a surfeit of information about other patterns of utilization, such as the distribution of visits throughout pregnancy, and the utilization of other health care services. This study was designed to address some of these gaps.

Barriers to Prenatal Care Utilization

Despite the methodological difficulties in proving the value of prenatal care, there is widespread acceptance of the importance of such care. The desire to improve the utilization of prenatal care has led to questions about access and barriers to care. Barriers to prenatal care have been classified into three kinds: sociodemographic, personal, and system (Curry, 1990; Institute of Medicine, 1988b).

Sociodemographic variables include: nonwhite race; Hispanic or Native American ethnicity; age less than 18 years or greater than 35 years; single marital status; low income; less than high school education; and rural residence (Hughes & Rosenbaum, 1989; Swartz, 1990; Willis & Fullerton, 1991). These variables are collinear and intercorrelated with poverty (Goldenberg, Patterson, & Freese, 1992; Swartz, 1990). Other barriers related to poverty include lack of private insurance coverage (Cooney, 1985: Poland, Ager, & Olson, 1987), and transportation problems (Leatherman, Blackburn, & Davidhizar, 1990; Lia-Hoagberg et al., 1990; Poland, Ager, & Olson, 1987).

Personal barriers have been extensively studied (Chavez, Cornelius, & Jones, 1986; Curry, 1987, 1990; Goldenberg, Patterson, & Freese, 1992; Infante-Casteñeda, 1990; Leatherman, Blackburn, & Davidhizar, 1990; Lia-Hoagberg et al., 1990; Poland, Ager, & Olson, 1987; St.Clair, Smeriglio, Alexander, & Celenteno, 1989; Swartz, 1990; Young, McMahon, Bowman, & Thompson, 1989). Some women think of pregnancy as a natural rather than a medical condition. These women may lack knowledge about the value of prenatal care, or not be familiar with the resources for care available in the community. They may have ethnic and cultural beliefs that differ from mainstream medical practice. Other women have negative perceptions of medical care, health care providers, and the health care system. Women may delay seeking prenatal care when they have ambivalent or negative feelings about the pregnancy. They may have irregular menstrual cycles and not realize they are pregnant for several months. Women may be too preoccupied with difficult or dysfunctional lifestyles such as substance abuse, homelessness, or overwhelming competing life demands to seek out and/or continue prenatal care. Personality characteristics such as depression and low self-esteem may act as barriers to caring for oneself enough to get prenatal care. A small and dispersed social support network may fail to encourage or help the pregnant woman to get prenatal care. Lack of child care may also discourage pregnant women from negotiating the system to get into prenatal care.

System barriers vary with the institutional setting. In many communities, there are few prenatal care providers, especially those who accept Medicaid or who are willing to make billing arrangements for self-paying clients (Nesbitt, Connell, Hart, & Rosenblatt, 1990). Malpractice and liability issues may also limit the number of providers willing to care for low-income or high-risk women (Green & Higginson, 1989). Distance and the time it takes to travel to health care services is a problem both in rural areas (Hughes & Rosenbaum, 1989) and in inner city settings where public transportation may be unreliable or inconvenient. Language barriers exist when providers don't speak the same language, use technical rather than lay medical terminology, or use a patronizing tone with clients. Inadequate outreach and follow-up are also barriers to care (Curry, 1987). In the public sector, under-funded, overcrowded clinics are often characterized by long waits, inconvenient appointments, and frazzled, overworked, providers. Poor coordination of services results in multiple eligibility requirements, excessive paper work, gaps in services, and duplicated services. Such crowding and inefficiency foster time-consuming, frustrated communications between client and provider, and between providers (Curry, 1987, 1990; Inglis, 1991).

A multivariate analysis of 12 studies on barriers to prenatal care, conducted by the Institute of Medicine (1988, pp. 103-112), pointed to a consensus on several themes. Most strikingly, demographic markers such as low income, unemployment, lack of insurance coverage, single marital status, age less than 20, and less than a high school education, significantly predicted inadequate utilization of prenatal care. Membership in racial and ethnic groups was not significant when these socioeconomic variables were controlled, leading the analysts to conclude that poverty accounted for the finding rather than racial or ethnic status per se.

Another theme to emerge from the IOM analysis was the significance of whether the pregnancy was planned and wanted. It was hypothesized that women who are planning a pregnancy are more likely to know they are pregnant early on and seek prenatal care than women who don't want to get pregnant. A third theme apparent in the IOM analysis was the importance of the pregnant woman's perception of the value of prenatal care, her linkage to the health care system, and her attitudes towards health care providers. Women who attach little value to prenatal care, whose links with the system are tenuous, and have negative attitudes towards providers are less likely to get adequate care.

The final theme to emerge from the IOM analysis is the salience of parity. Higher parity is associated with less prenatal care. The analysts hypothesize several explanations for this finding. Pregnant women with children may face problems with child care, financial burdens, and other family responsibilities. They may feel as if they know what to expect from a normal pregnancy and will only seek care if untoward symptoms develop. Finally, they may have been unsatisfied with their care during previous pregnancies.

The authors of the IOM study suggested that information from their analyses can be used to design programs that promote participation in prenatal care. Yet they also cautioned that more research is needed to understand the barriers to prenatal care. For example, targeting programs to the poor is only a partial solution. Even within homogenous low-income groups, the utilization of prenatal care varies, and many factors influence this health behavior.

Mexican Americans and Barriers to Care

Mexican Americans face many of the barriers to care mentioned above. They report that cost, needing someone to take care of their children, transportation, and losing pay from work are the most common barriers to seeking health care (Estrada, Treviño, & Ray, 1990). Mexican Americans are more likely to use overburdened public health clinics for care, to wait longer than 30 minutes for their appointment, to be less satisfied with their health care provider, and to report more difficulties in accessing care, than the population as a whole (Andersen, Giachello, & Aday, 1986).

In addition, language, culture and the experience of immigration affect their utilization of health care (Inglis, 1991; Jasis, 1987; Quesada, 1976; Quesada & Heller, 1977). Language differences may present additional barriers to finding out about community resources for pregnancy-related health care and social services, making appointments, and establishing rapport and communicating with health care providers and office staff (Hu & Covell, 1986; Solis, Marks, Garcia, & Shelton, 1990).

Mexican Americans are highly mobile, and are more likely to be newcomers to their communities than the general population (Andersen, Giachello, & Aday, 1986). Immigration and mobility both disrupt family and social networks (Inglis, 1991), and newly-arrived Mexican Americans may lack knowledge about community resources (Chavez, Cornelius, & Jones, 1986). Undocumented Mexicans may avoid seeking care for fear of detection by immigration authorities (Chavez, Cornelius, & Jones, 1986; Gaviria, Stern, & Schensul, 1982). Illegal status also precludes access to assistance programs such as Medicaid, and this inability to afford care also decreases utilization. Young, foreign-born, Mexican American women are especially likely to face barriers to accessing health care (Estrada, Treviño, & Ray, 1990).

Four studies were located that specifically addressed Mexican American women's perceptions of barriers to prenatal care. In the first, Meikle, Orleans, Leff, Shain and Gibbs (1995) interviewed 606 women who had inadequate prenatal care, who started care in the third trimester, or had zero to four prenatal visits. These women had delivered at the Denver General Hospital between 1989 and 1991, and were interviewed during their postpartum stay. The sample was 48% Hispanic and predominantly Mexican American.

The Hispanic women in the study were significantly more likely than the Anglo and African American women to report that they didn't seek prenatal care because they were getting good advice from their family and friends. They were also more likely to report delaying prenatal care because they didn't have money and didn't have insurance.

Stewart (1995; see also Moore Hepworth, 1994) reported barriers encountered by a sample of 620 women who were enrolled in the Arizona Health Care Cost Containment Program and gave birth between 1989 and 1990. Three hundred and eight women in the sample were Mexican Americans. Among the Mexican American women, 59% had inadequate prenatal care. Women were interviewed in their homes about their experiences with prenatal care.

In this study, Mexican American women reported more transportation and child care problems than did the Anglo women. Mexican American women who were satisfied with the quality of services were more likely to have had adequate prenatal care than those who were dissatisfied (*p* = 0.001).

The results of these two studies must be interpreted with caution, because their sampled respondents were not representative of the Mexican American population as a whole, nor of the ROMPP population. In the Denver study, the entire Hispanic sample was English-speaking, and 76% of the Hispanic women were unmarried. In the Arizona study, all the women were eligible for Medicaid, 95% of the Mexican Americans in the sample chose to be interviewed in English, and 59% had never married.

Gray, Lawrence, Arregui, Phillips, Bell, Richards, Fukushima, and Taeusch (1995) interviewed 25 Mexican American women on a postpartum unit at a large hospital in Los Angeles. Ten of these women had given birth to LBW infants. Eighty percent of the Mexican American women who give birth at the hospital were born in Mexico. The Mexican American sample was predominantly married, multiparous, low-income, and had limited educations. The study sample also included 14 African American women.

Almost all the women reported that prenatal care was important, yet 40% of the Mexican American women had fewer than six prenatal visits. Among the reasons most often cited for less-than-optimal care were: knowing what to do since pregnant before (55%); transportation problems (36%); long office waits (34%); not enough money (32%); and language barriers (21%). Unfortunately, the analysis of women's responses about barriers to prenatal care were not broken down by race or ethnicity.

Zambrana, Dunkel-Schetter, and Scrimshaw (1991) interviewed 107 pregnant primiparous women at county-run prenatal clinics in Los Angeles in 1988. Eighty-eight Mexican American women were born in Mexico; 21 of these women had lived in the U.S. since the age of 10, but the other 66 women had immigrated to the U.S. within the past seven years. There were also 20 African American women in the study sample, for a total of 107 women. The average gestational age at the time of interview was 31 weeks.

The recent immigrants were more likely than the other two groups to initiate prenatal care in the third trimester, and also to report that they had initiated care "as soon as they wanted." Sixteen percent of the recent immigrants started care in the third trimester, compared to 10% of the African American women, and 4.8% of the other Mexican

American women. Yet 77% of the recent immigrants reported that they had started care as soon as they wanted, compared to 61.9% of the other Mexican women and 55% of the African American women.

The authors posited that the large number of recent immigrants reporting that they sought care as soon as they wanted yet initiating prenatal care in the third trimester indicate attitudinal and knowledge barriers to prenatal care. Yet they also noted that, while the interview did not formally ask about barriers to prenatal care, "a notable number of all respondents, and especially recent Mexican immigrants" reported problems with availability and affordability of care (p. 293). The women didn't know where to get care, they waited a long time for appointments, and they didn't have health insurance to pay for care.

The four studies reviewed above tend to confirm that Mexican American women face the same kinds of barriers in seeking prenatal care that they experience with the health care system as a whole. Financial concerns, lack of knowledge about where to obtain care, dependence on over-crowded public clinics with their long waits for appointments and long clinic waiting times, transportation and child care problems, and language differences all act as barriers to prenatal care. In addition, there is evidence for attitudinal barriers to care, which will be explored in the next section.

Mexican American Cultural Beliefs and Prenatal Care

Immigration forces issues of acculturation. In this section, a discussion of acculturation provides the basis for understanding some of the variation of *mestizo* cultural beliefs. Then, a summary of *mestizo* beliefs about prenatal care and pregnancy is presented. *Mestizos* are Mexican Americans who acknowledge indigenous Indian ancestry without necessarily identifying with any particular indigenous cultural group or tribe.

Acculturation

Acculturation "comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original cultural patterns of either or both groups" (Herskovits, 1936, cited in Keefe & Padilla, 1987, p. 15). Berry (1980, pp. 10-11) portrays the course of acculturation in three phases. The first is contact via trade, conquest, missionary activity, or mass media. The second is conflict, as groups react to both attractive and coercive elements of the foreign culture. The last phase is adaptation, a process in which conflicts are reduced or stabilized. In the U.S., the ideology of the "melting pot" places pressure on immigrant or minority ethnic groups to direct acculturative change to reflect the dominant majority culture, rather than the reverse.

Acculturation occurs at a group or population level, e.g., across generations, and at an individual level, as individuals adapt to a new cultural environment (Burnam, Telles, Karno, Hough, & Escobar, 1987). At the aggregate level, the process is influenced by the "history, persistence, and purpose of the cultural contact, the nature of the group conflict, and the adaptations achieved by the two groups" (Berry, 1980, p. 12). At the individual level, the process is influenced by "exposure to the other culture, the interpersonal and intrapersonal conflicts and crises experienced, and the personal adaptations made to the situation" (Berry, 1980, p. 12). Thus cultural, ecological, and personality variables all operate simultaneously (Garza & Gallegos, 1985).

The complexity of this process has only recently begun to be explored empirically by Latino scientists, and there is little consensus in the field. Most research which attempts to measure acculturation focuses on language preference, such as English versus Spanish, and generation from immigration, such as Mexican-born versus U.S.-born versus third generation. In the case of Mexican Americans, this generational model ignores the complexity of geographic proximity, which allows relatively easy travel back and forth across the border, at least in comparison with the geographical realities confronting immigrant groups from other continents.

There are at least four different models of acculturation in the current literature. The first three models are presented by Keefe and Padilla (1987). The first model is the least complex. Acculturation is conceptualized as a single linear continuum from unacculturated to acculturated. This model assumes eventual assimilation into the majority culture and loss of original cultural traits. The bicultural person is simply in the middle of the transition process.

The second model places each cultural system on intersecting axes to create four quadrants or types of acculturation: unacculturated, bicultural, marginal, and acculturated. The bicultural person in this model is adept in both cultures. The marginal person is "deculturated" and comfortable in neither culture (Stonequist, 1937, cited in Keefe & Padilla, 1987, p. 16). The unacculturated person remains immersed in his or her culture of origin. The acculturated person has accepted and internalized the cultural patterns of the new cultural system. The model does not assume the loss of original cultural traits as new cultural traits are added.

The third model of acculturation is a multidimensional and multifactorial model of "selective acculturation." In this model, some native traits are lost, while others are retained or even strengthened depending on the individual's personality and the social context. The bicultural person in this model has a mix of traditional and adopted traits in different combinations. Such traits may include preferences for different languages in different contexts, work and leisure activities, media outlets, food and music, ways of celebrating special events, and relationships with family and the larger community (Burnam, Telles, Karno, Hough, & Escobar, 1987).

The fourth model, presented by Mendoza (1984), posits four patterns of acculturation: (a) cultural resistance, both active and passive, against dominant culture while maintaining native customs; (b) cultural shift, substituting one set of cultural traits for another; (c) cultural incorporation, adapting alternate customs from both native and alternate cultures, and (d) cultural transmutation, altering native and alternate customs to create a unique subcultural entity. An acculturated person may use different acculturative strategies in the various domains of their lives, for instance, cultural resistance in their friendships and family life, cultural shift in dress and music preferences, and cultural transmutation by code-switching from Spanish to English or employing a dialect such as Caló.

This study does not adopt any one of these models of acculturation, but instead takes an eclectic approach in this review. There is an extensive literature documenting Mexican American cultural beliefs about health care (Farge, 1977; Rubel, 1960; Schreiber & Homiak, 1981; Weaver, 1973) and pregnancy and childbearing (Clark, 1970; Hahn & Muecke, 1987; Kay, 1977, 1980; Kelly, 1965). This review focuses on *mestizo* beliefs about pregnancy, prenatal care, and childbirth. *Mestizo* cultural beliefs are a combination of preColumbian traditions existing before the Conquest, and Spanish beliefs introduced during the Mexican colonial period (Kay, 1978), mixed with "modern" scientific ideas which have been incorporated into popular, predominantly urban Mexican and American cultures. In Mendoza's (1984) terminology, *mestizo* beliefs result from processes of cultural shift, incorporation, transmutation, and modernization.

While most of this discussion has focused on acculturation as a process between cultures, intracultural variation also exists. Within any culture, there is wide variability in the degree to which individuals within the culture subscribe to and act on the system of cultural beliefs. Age, rural or urban residence, social class, education, family traditions, personality, and life experiences all contribute to intracultural diversity in beliefs and practices.

A study by Castro, Furth, and Karlow (1984) illustrates this variability. They present evidence that Mexican American women subscribe to both folk and scientific concepts of health and illness. The extent of their belief in folk illnesses and theories of causation attenuates but does not disappear with increasing levels of acculturation. Women appear to pick and choose among beliefs, based primarily on past experiences, believing in a certain illness or theory of causation because "I saw it happen." A similar theme of belief based on personal experience was encountered in focus group data collected among ROMPP participants in Klamath Falls (Thompson, 1995).

Beliefs Relating to Prenatal Care and Pregnancy

Pregnancy is regarded as an essentially natural process which requires little intervention unless there are problematic symptoms (Alcalay, Ghee, & Scrimshaw, 1993; Jasis, 1987). Many authors report that Mexican American women are well aware of the physical symptoms which signal the need for medical attention during pregnancy (Alcalay, Ghee, & Scrimshaw, 1993; Infante-Casteñeda, 1900; Jasis, 1987; Kay, 1977, 1980).

There is an extensive literature regarding many Mexican Americans' cultural preference for traditional healers such as *curanderos* (traditional healers), *yerberos* (herbalists), *sobadoras* (masseuses), or *parteras* (lay midwives). DeWalt (1977) presented a typical framework, consisting of multiple levels of action in case of perceived illness. First, there is self-care within the network of family and friends. If self-treatment fails, then semi-professional curers who charge for their services may be consulted. If these fail, the patient may seek "modern" medical care.

More recent literature on both sides of the border questions whether consultation with traditional healers before mainstream medical care is sought results from cultural preference or economic necessity (Chavez, Cornelius, & Jones, 1986; DeWalt, 1973; Gaviria, Stern, & Schensul, 1982; Weaver, 1973). For instance, utilization of traditional healers tends to decrease as income and insurance coverage for health care increase.

Some Mexican American women report that prenatal care is embarrassing (Alcalay, Ghee, & Scrimshaw, 1993). Focus group participants in Klamath Falls echoed this theme (Thompson, 1995). They explained that the intimacy of the questions asked by the physicians and nurses was as embarrassing to their sense of modesty as the physical examinations.

In *mestizo* culture, moderate amounts of physical activity are encouraged, and excessive napping is avoided. Physical activity is believed to facilitate an easy delivery. The only proscribed activities are lifting heavy objects, which may harm the womb, and raising one's arms above one's head, which may cause knots in the umbilical cord. Sexual relations continue, which lubricate the birth canal and keep it open. The pregnant woman's emotions are widely believed to affect the fetus, especially anger, fright and envy. A calm, cheerful attitude and avoidance of gossip is favored.

Moving air, such as wind, fans, and air conditioning, is avoided. Environmental incidents such as earthquakes and eclipses also affect the developing infant and may be blamed for a variety of conditions, including miscarriage, breech presentation, oligohydramnios, cleft palate, birthmarks, talipes, extra digits, and other congenital malformations. Wearing a metal object such as a safety pin, or carrying scissors, keys, or a knife, or wearing red panties, are all mentioned as precautions to guard against such untoward effects. These beliefs were expressed by some but not all of the ROMPP participants in the focus group data (Thompson, 1995).

Food cravings must be satisfied or the baby may be marked accordingly, e.g., a red birthmark results when strawberries are craved but not eaten. Milk and cheese may be avoided because these foods make babies larger and harder to deliver. Yet a traditional diet based on tortillas and beans is rich in calcium and protein, so avoidance of milk products is not necessarily problematic. Chili and other foods may be avoided because it is believed they harm the fetus. Prenatal vitamins are widely accepted and used, and vitamins are thought to increase the appetite. Among Mexican-born and less-acculturated women, alcohol and tobacco use are minimal (Haynes, Harvey, Montes, Nickens, & Cohen, 1990; Markides, Ray, Stroup-Benham, & Treviño, 1990). It is widely known that these substances should be avoided during pregnancy and lactation.

Pregnancies which end in miscarriage or fetal demise may not be counted when the mother reports how many times she has been pregnant (Burton, 1993). The author's clinical experience with Mexican American farmworkers indicates that neonatal complications which were resolved successfully with no apparent enduring sequelae may not be reported.

Mainstream medical practice judges many Mexican American pregnancy practices as healthful, such as ideas about physical activity, acceptance of prenatal vitamins, and avoidance of alcohol and tobacco. On the other hand, some Mexican American beliefs are often dismissed as "superstitions" by Anglo-oriented health care providers, such as the effect of the mother's emotions or eclipses of the fetus. If the pregnant woman seeks care based on her exposure to events that she believes are potentially harmful, and receives an incredulous or disrespectful response from a disbelieving health care provider, tensions may arise in the client/provider relationship.

From the point of view of Anglo-oriented health care providers, the most problematic of these beliefs is the tendency not to seek formal medical attention unless worrisome symptoms arise. In the language of "barriers," Mexican American culture views pregnancy as a natural rather than medical condition, and may not be aware of the value of prenatal care for the prevention and/or early detection of complications. The resulting delay in seeking prenatal care until symptoms arise is exacerbated by the often economic necessity of attempting various self-care measures, and consulting with family, friends, and perhaps traditional healers in the face of such symptoms.

Programs to Improve Prenatal Care Utilization

In 1988, the Institute of Medicine released the results of its two-year study on improving the use of prenatal care by lowering barriers and increasing access (Institute of Medicine, 1988). The report outlined five recommendations: (a) reduce financial obstacles; (b) increase the capacity of the system; (c) improve institutional practices; (d) develop outreach and case finding activities, within the limits imposed by system capacity; and (e) provide social support to pregnant women (IOM, 1988, p. 116). The American Nurses' Association has made similar recommendations (Curry, 1987).

The remainder of this review will describe programs that aimed at improving prenatal care utilization by providing coordinated health and social services, community-based outreach, and social support. These programs, designed to supersede nonfinancial barriers to care, are hypothesized to effect change by influencing women's behavior through education, motivation, and facilitation (Olds & Kitzman, 1993; Schlesinger & Kronebusch, 1990).

It should be noted that there are few studies in the literature that include Hispanics or Mexican Americans in their samples. Where these are available, they have been included. Given this dearth of information, studies that focus on other populations are included in the review. The relevance of their findings for the Mexican American population will be assessed.

The review is divided into three subsections: clinic-based coordinated comprehensive services; community-based nursing interventions; and community-based interventions by nonnurse community health workers. The final section in the review summarizes the studies' conclusions, and discusses of the implications of the studies for Mexican Americans.

Clinic-Based Comprehensive Prenatal Care

In this section, ten studies that evaluated the effectiveness of clinic-based comprehensive care will be reviewed. These programs all featured comprehensive and coordinated medical and social services; nutritional assessment, counseling, education, and WIC referral; health education; and tracking and follow-up after missed appointments. Some offered transportation. Some had nurse practitioners and certified nurse midwives as primary health care providers.

The first six studies to be reviewed used birth certificate data to evaluate the impact of the program. In the first study, Korenbrot (1984) and Lennie, Klun, and Hausner (1987) report results from the OB Access Project, a Medicaid/MediCal demonstration project conducted in 13 California counties in 1979 to 1982. The project focused on changing reimbursement structures and mandating a service package. The package included: an initial health history with comprehensive physical, psychosocial, and health education assessments, with counseling as needed; birth and parenting education; prenatal vitamin and mineral supplements; routine prenatal and postpartum care, with appropriate care for high-risk conditions; arrangement for planned delivery in a hospital, with advance financial arrangements for that care; and one well-baby examination postpartum.

Women enrolled in the OB Access Project with singleton births (N=5,244) were matched to an equal number of women who had received MediCal in 1978, by race, infant's sex, plurality (single versus multiple birth), age of mother, parity, and county. The women enrolled in the OB Access project had a LBW rate of 4.7%, compared with 7.0% for the comparison group. There were 2,825 women who received the full complement of OB Access services, which consisted of at least eight prenatal visits including the initial exam and assessments, at least one birth education class, and vitamin supplementation. Their rate of LBW was 3.1%, compared to 7.7% for the MediCal controls. There was no attempt to assess the adequacy of prenatal care of the comparison women, nor make statistical inferences. The sociodemographic characteristics of the two groups of women were not reported.

Peoples, Grimson, and Daughtry (1984) reported the effects of the Improved Pregnancy Outcome (IPO) Project, which delivered services to women in two North Carolina counties between 1979 and 1981. The IPO was staffed by certified nurse midwives. Health department services were expanded to include nutrition counseling, social services, and health education. Interdisciplinary patient care teams were formed. A system of screening for high risk pregnancies was instituted, and a high risk clinic was begun. Outreach and transportation services were developed. Of the 648 project registrants, 83% were African American.

The 318 women in the comparison group were drawn from two geographically contiguous counties. Analysis was stratified by age since the IPO project services were targeted at but not limited to, adolescents (N = 297). Adequacy of prenatal care was assessed using a dichotomous Kessner designation of adequate or less-than-adequate care.

Over forty percent (41.2%) of the IPO registrants received adequate prenatal care, compared to 30.3% of women in the comparison counties ($p < 0.0001$). Among teens, the differences are more dramatic: 37.8% of IPO registrants had adequate prenatal care compared to 18.3% of teens in the comparison counties ($p < 0.0001$). Despite such differences in adequacy of prenatal care, there was no corresponding improvement in the rate of LBW in the IPO counties.

One possible explanation for the failure to find improvement in the LBW rate was the noncomparable comparison group. The IPO registrants had more women at higher risk for LBW than the comparison group. Among the IPO registrants, there were more under-educated, unmarried teen primiparas, and fewer women older than 35 years, grand multiparas, and women with poor reproductive histories than in the comparison group.

Peoples and Seigel (1983) studied the effects of the North Carolina Maternity and Infant Care (MIC) project. This project offered public health nursing, nutrition, and social services, health education, dental and medical care to pregnant women and their infants through the first postpartum year. Outreach, transportation, and follow-up of missed prenatal appointments were also provided.

Three rural counties between 1970 and 1977 were evaluated. The analysis compared the rate of low birthweight and adequacy of prenatal care among 5,822 women who enrolled in the MIC program and received at least one prenatal visit, with a group of 11,447 women residing in three demographically similar comparison counties who gave birth during the study period. While the comparison group was similar to the MIC group, MIC women were more likely to be nonwhite, unmarried, undereducated, adolescent primiparas, and slightly less likely to have a history of poor pregnancy outcome. Adequacy of prenatal care was assessed via the Kessner index.

Using a multivariate least weighted squares procedure, the authors found that while MIC women were more likely to have adequate prenatal care, they were also more likely to have LBW infants, than were women in the comparison group. A more detailed analysis of the interaction of maternal race, age, parity, marital status, reproductive risk, and group membership revealed that the MIC program had little influence on the subpopulation of women at lowest risk, but it improved prenatal care utilization and the rate of LBW among women at higher risk. This was especially true for young, nonwhite mothers. Just over 20% (20.5%) of the MIC mothers had inadequate prenatal care, compared to 36.8% of the comparison group. The rate of LBW in these mothers was 12.6% and 14.4%, respectively.

In a later study also set in North Carolina, Buescher, Smith, Holliday, and Levine (1987) reported outcome data for a county-based comprehensive prenatal care program evaluated in 1984. The intervention's 396 program enrollees were predominantly unmarried and African American, and were not eligible for Medicaid under the requirements in effect at the time. The 362 women in the comparison group were drawn from women living in the same county receiving Medicaid, who were referred to private obstetricians for prenatal care. Thus the study was essentially a comparison between public and private source of care. The adequacy of prenatal care was reported as a dichotomous Kessner index.

More women in the intervention group had inadequate prenatal care than did the women in the comparison group, 44% and 38.2% respectively. Yet the LBW rate among the women receiving the intervention was 8.3%, compared to 19.3% for the women on Medicaid who received care by private physicians ($p < 0.0001$). Logistic regression demonstrated that, after controlling for race, marital status, age under 18, education, WIC participation, adequacy of prenatal care, and history of poor pregnancy outcome, the women receiving private Medicaid-financed care were on average twice as likely to have a LBW baby ($p = 0.007$). The authors attributed the improvement in the LBW rates among the women receiving the intervention to their access to the ancillary, nonmedical services of the program such as patient education, home visits, social services, and WIC. In addition, nurse practitioners provided most of the prenatal care.

The most serious threat to the validity of this study is the noncomparability of the two groups. The Medicaid women were more likely to be nonwhite and unmarried, and to have a multiple gestation pregnancy. Because of the extremely low income cutoff for Medicaid eligibility at the time of the study, it is likely that the mean family income in the Medicaid group was lower than for the group receiving care at the county. The authors presented evidence against this explanation. A group of 138 women who received care at the county but were eligible for Medicaid before delivery had a LBW rate of 9.4% compared to the 19.3% rate for women who actually received Medicaid and received private care. The authors noted that a demographically matched case control design would be desirable to provide stronger evidence for their results.

Strobino and her colleagues (Strobino, Chase, Kim, Crawley, Salim, & Baruffi, 1986) evaluated the effects of two Improved Child Health Projects (ICHP1 and ICHP2) that were implemented concurrently in four Mississippi counties in 1979. The projects developed a coordinated system of comprehensive prenatal care by adding staff and services to programs in the counties' health departments. New services included: maternity and pediatric clinics staffed by physicians and nurse practitioners; home visits to high risk mothers and infants within a week of discharge from the hospital; tracking missed appointments and outreach activities; social services; and transportation. The patients of local private providers were also eligible for "many" of the project's services, though these were not specified in the research report. Private providers were also able to take advantage of the tracking system. A part of the ICHP budget was set aside to pay in-hospital costs incurred by medically indigent and financially needy patients. While ICHP1 and ICHP2 were both implemented in 1979, the community support and coordination elements of the project were not implemented in the ICHP2 counties until the final year of the project. Also, the tracking system in ICHP1 counties was computerized, whereas only a manual system was developed in the ICHP2 counties.

The design of the evaluation study was complex. The study sample consists of all live births to residents of the ICHP counties during the pre-project period of 1975-78 and the project period of 1979-81. The comparison sample for ICHP1 consisted of all live births during the same time frame in six sociodemographically similar counties. The comparison sample for ICHP2 drew on these same six counties, and an additional four counties. Thus there were two types of comparison groups available for analysis. There were "site" controls in the study counties during the period before the intervention project, and "chronological" controls in the comparison counties both before and during the intervention time period. The number of subjects in the eight samples was large, ranging from 4,798 for ICHP1 comparison counties during 1979-81, to 15,154 for ICHP2 treatment counties during 1975-78. Adequacy of prenatal care was measured using a dichotomous Kessner index.

There was an increase in adequacy of prenatal care in both sets of project and comparison counties between the pre-project and intervention periods, for whites and nonwhites alike. But the most substantial increase occurred in the ICHP1 counties among nonwhite women, a 16.10% increase in adequacy, compared to the 9.98% for the comparison counties. There was no change in the rate of LBW in any of the counties between the two periods. The study authors attributed the improved adequacy of prenatal care to community emphasis of the project, and its availability to both public and private providers.

Again, the weakness of this study is noncomparability of the intervention and comparison groups. The demographic match for race, mean family income, and ruralness was closer to comparability in the ICHP1 group than in the ICHP2 group, yet neither comparison group was truly comparable.

The final study which used birth certificate data evaluated a prenatal case management program for Medicaid enrollees (Piper, Mitchel, & Ray, 1992). Project HUG (Helping Us Grow) was implemented in 89 of 95 Tennessee counties in 1989. Women entered the program through their county health departments, and were assigned an RN or social worker to coordinate their care using a case management model. Services included referral to prenatal care providers and nutritional programs, help with scheduling visits and transportation, follow-up on missed appointments, and health education.

A retrospective cohort analysis was performed among the Tennessee Medicaid cohort delivering from July 1989 through December 1991. The sample included Anglo and African American woman with singleton births or fetal deaths who were enrolled in Medicaid from at least 120 days (four months) after their last menstrual period through delivery. Births recorded with implausible birthweights or missing demographic information were excluded from the analysis. The final sample size was 66,051, and 3,859 women, about 6% of the sample, had received HUG services. Thirty-eight percent of the sample were African Americans, 48% had not graduated from high school, 59% were unmarried, and 37% were primiparous. HUG mothers were more likely to be teens, primiparous, and smokers, but less likely to be African American, unmarried, or high school graduates.

Results showed that HUG participants were 29% less likely to have received inadequate prenatal care, as measured by a modified Kessner index. Among African American HUG mothers, the difference was more pronounced; they were 54% less likely to get inadequate prenatal care. There were no differences between HUG participants and nonparticipants in the incidence of preterm birth and very low birthweight.

The study was limited by nonequivalent control groups and the inability to exclude selection bias as the reason for the favorable differences in prenatal care utilization. They noted that the HUG program reached only a small proportion of the Medicaid population at risk, and recommended that similar programs include other public and private prenatal care providers.

The next four studies used medical records to evaluate the effectiveness of comprehensive prenatal care. Leppert and Namerow (1985) reported the effects of the Young Parents Program (YPP) of the Presbyterian Hospital in the City of New York in 1981 and 1982. The YPP featured primary prenatal care provided by certified nurse midwives. Other personnel involved in the program were a physician specializing in maternal-fetal medicine, who also directed the program, a social worker, a nutritionist, a community outreach worker, a consulting obstetrician, and psychiatrist who consulted on a volunteer basis. Services included clinic visits every two weeks during the first two trimesters, and weekly during the third trimester. Missed appointments were followed up by phone. Home visits were conducted, but their frequency and content were not outlined in the report.

The analysis compared a group of 344 program enrollees who received at least three prenatal visits with an equal number of enrollees who received two or fewer visits.

Although the source of data for analysis in this study was not stated, it was presumably medical records.

The LBW rate for the former group was 10.2%, compared to 35.2% in the latter group. While the mean number of prenatal visits among all program enrollees was 8.7, there was no evaluation by index of the adequacy of prenatal care in the two groups. The authors concluded that comprehensive prenatal care is effective in preventing low birthweight in adolescent women, but they did not speculate about what component or components of the program were responsible for the effect.

The sociodemographic characteristics of the two groups were not presented, nor were any factors other than number of prenatal visits considered in the analysis. This is especially problematic in light of the fact that, unlike the OB Access Project evaluation described above, the YPP study did not use demographically matched controls.

Kay, Share, Jones, Smith, Garcia, and Yeo (1991) evaluated the effects of a comprehensive prenatal program ("The Corner") aimed exclusively at adolescents in Michigan between 1981 and 1988. The comparison group received standard prenatal care delivered at a university-based clinic. While the authors stated the program was community-based, the intervention and clinic personnel were not described. The program seems similar to other clinic-based services, such as the YPP, in its emphasis on clinic services designed for and accessible to adolescents.

The sample included all 180 Corner clients who received at least three prenatal visits and delivered at a nearby university medical center between 1981 and 1988. An equal number of women who received at least three prenatal care visits at the university-based clinic were selected by pulling the first 180 medical records which matched the women in the Corner sample on age and year of delivery. An analysis of the characteristics of the two groups revealed that the groups were similar in age, race, educational levels, marital status, employment status, parity, and medical risk status. The only significant difference between the two groups was that the Corner women were twice as likely not to have insurance coverage (15.6% versus 7.4%, $p = 0.02$). The source of all data in the analysis was medical records at the clinics and hospital.

The young women receiving care at the Corner had significantly more prenatal visits, 12.79 versus 9.79 ($p <$

0.01), and fewer unscheduled outpatient visits, 0.63 versus 1.06 ($p = 0.01$), than did the comparison group. The differences in the rate of LBW and other biomedical outcome measures were nonsignificant when adjusted for age, race, insurance coverage, and smoking status.

McLaughlin, Altemeier, Christensen, Sherrod, Dietrich, and Stern (1992) evaluated the effects of a comprehensive prenatal care program staffed by nurse midwives in Nashville in an unspecified year before 1989. This study is the only one reviewed in this section that featured random assignment of screened subjects into comprehensive or standard prenatal services.

Women in the intervention group received prenatal care provided by a team of nurse-midwives, social workers, a nutritionist, paraprofessional home visitors, and a psychologist. The emphasis of the intervention was on psychosocial support, education about self-care, and promotion of healthy behaviors such as good nutrition, avoidance of drugs and alcohol, and smoking reduction. Missed appointments were followed up by phone calls, letters, and in some cases, home visits. The program's clients were offered individual meetings with the psychologist from recruitment into the program until 28 weeks gestation, when they were invited to join prenatal support groups led by the psychologist. The support groups were designed to offer support, health promotion, and childbirth preparation.

The 428 women who met the screening criteria were: less than 28 weeks gestation at their first prenatal visit to a local public hospital clinic; residents of the same county; at risk of child maltreatment as measured by the Maternal History Interview; and consented to random assignment. Initially there were 217 women in the treatment group and 211 women in the comparison group. The attrition rate for the treatment group was 8%, and for the comparison group, 13%. Problems in obtaining complete data subtracted another 6% and 14%, respectively. The final sample sizes were 170 and 138, representing 78% of the original treatment group, and 65% of the original comparison group. There were no significant differences between the groups on age, education, and race. However, women in the treatment group were more likely to be unmarried primiparas.

Data were collected from medical records by research assistants who were blind to the treatment group assignment of the mothers. Multiple regression analysis was performed on variables of sex of infant, maternal age, race, marital status, education, height, pregravid weight, presence of pregravid medical problems, drug and alcohol use, cigarette smoking, and assignment to treatment or comparison group. The results revealed a difference in birth weight attributable to the intervention for primiparous but not multiparous mothers (Beta = 0.17, $p < 0.05$). ANOVA of the data for primiparous women revealed main effects for age less than 16 years. Chi square revealed no difference in LBW rates between the two groups, regardless of parity. Treatment groups mothers had 11.8 prenatal visits, and comparison group mothers had 10.0 visits ($p < 0.001$), but adequacy of prenatal care was not measured with an index.

The study design precluded specification of which elements in the intervention contributed to the improved outcomes among the primiparous women in the intervention group. The authors hypothesized that the intervention more effectively influenced outcomes in primiparous women because they are more receptive to multiparas with more established patterns of behavior.

The last study reviewed in this section is the only clinic-based program targeted to Mexican Americans. The Comprehensive Perinatal Program (CPP) has provided services on a sliding fee scale at 10 community clinics in San Diego County since 1980 (Bahry, Fullerton, & Lops, 1989; Moore, Origel, Key, & Resnik, 1986). The CPP program offered obstetric care provided by certified nurse-midwives, nutritional assessment and support, social service, and home-outreach services. Weekly high-risk case conferences brought the team together with a perinatalogist to review the records of clients with complications.

Moore, Origel, Key, and Resnick (1986) reported a study comparing the pregnancy outcomes of 100 women who initiated care in the CPP system before 20 weeks of gestation, compared to an equal number of women with a history of no prenatal care. All the women delivered at the same university hospital. At the hospital, nurse-midwives from the CPP managed the labor and delivery of the CPP clients, while the women in the comparison group were cared for by obstetric house staff and faculty. The only matching criteria applied to the two samples was week of delivery. Nonetheless, the CPP and comparison women were similar in age, parity, foreign citizenship, eligibility for Medicaid, prior obstetric history, and presence of substance abuse.

There were significant differences between the groups in the rate of LBW. Women who received prenatal care in the CPP program had a 6% rate of LBW, compared to 21% in the comparison group. Given the demographic homogeneity of samples, the authors discounted the rival hypothesis of self-selection to prenatal care. They posited that the primary reason for lack of prenatal care among the comparison group was the lack of availability of prenatal services. This hypothesis is supported by the fact that many of the women in the comparison group, who received no prenatal care, were on the waiting list for CPP services at the time they delivered. Due to limited funding, the CPP was able to enroll only 100 patients per month. Based on the waiting list for services, the potential number of clients was over 200 patients per month.

Summary of clinic-based programs. Six of the ten studies in this section (Kay et al, 1991; McLaughlin et al, 1992; Peoples, Grimson, & Daughtry, 1984; Peoples & Siegel, 1983; Piper, Mitchel, Jr., & Ray, 1996; Strobino et al, 1986) showed some success in improving the utilization of prenatal care, as measured by number of prenatal visits or by the Kessner index. And six studies showed some success in decreasing LBW, again most commonly in adolescents and/or primiparas (Bahry, Fullerton, & Lops, 1989; Buescher et al, 1987; Korenbrot, 1984; Leppert & Namerow, 1985; McLaughlin et al, 1992; Peoples & Siegel, 1983). There appears to be little consensus about which elements of the comprehensive interventions were responsible for positively influencing prenatal care utilization and the rate of LBW. None of the studies featured designs which would allow such an analysis.

The studies' findings were often compromised by comparison groups that are not described at all, or were clearly at higher risk. Even in the studies where the comparison groups were comparable on the matched variables, other potentially relevant intervening variables such as income, smoking history, or substance abuse, were not always considered in the analyses. These variables are not always included on birth certificates, and may not have been available for analysis. None of the study designs was able to exclude self-selection to prenatal care as a plausible rival hypothesis to explain differences in prenatal care utilization and LBW rates. Generalizability to the current effort is limited by lack of data concerning Hispanic and Mexican American populations, and by geographical setting, as most studies were conducted in the South.

Community-Based Nursing Interventions

This section summarizes data from three community-based programs which provided case-finding, outreach, home visitation, and/or social support services delivered by registered nurses.

Case-finding and outreach are designed to mitigate women's lack of knowledge or motivation to seek prenatal care. Home visitation offers comfort and convenience to the client, and gives the provider the opportunity to observe and comprehend the client's life situation in a way not possible in the clinical setting. The provider has more information with which to develop a more highly individualized plan of care which addresses environmental conditions and stressors which may never come to light in a purely clinic-based program. The provider is also able to offer more personalized formal and informal social support, reassuring the client that she is not alone to face her life circumstances. This caring and support build the rapport necessary for the provider to encourage and facilitate changes in the client's health habits and behaviors.

There are two studies in this section which feature randomized clinical trials. In the first, Olds, Henderson, Tatelbaum, and Chamberlin (1986) evaluated the effects of home visitation on many outcome measures, including prenatal care utilization and LBW. The study was conducted in upstate New York from 1978 to 1980.

Four hundred families were assigned to one of four treatment conditions. The first group received no services through the research project, and served as controls. The second group received free transportation to prenatal care and well-child care at local clinics and private physicians' offices. The third group received a nurse home-visitor intervention during their pregnancy, in addition to the same transportation services offered to the second group. The fourth group received services similar to those in the third group, but the nurse home visitation continued past the postpartum period through the 24th month. The emphasis of the home visitation was on parent education, enhancement of informal support systems, and linkage to community services. Recruitment into the program was directed at but not limited to single, low-income pregnant adolescents less than 25 weeks of gestation at induction.

The analysis of the effects of the intervention was based on data collected in the course of the intervention and on medical records. Data from women in treatment groups 1 and 2 were combined to yield a sample of 165. Data from treatment groups 3 and 4 were combined for an total sample size of 189. Data on the 46 nonwhite women participating in the study were discarded because the sample was too small to allow the consideration of race in the analysis. Twenty participants with maternal and/or fetal conditions predisposing to preterm delivery or LBW were removed from the analysis to isolate the effects of home visitation from medical complications. The nurse-visited and comparison groups were demographically similar, but the nurse-visited group reported somewhat less social support than the comparison women. Attrition from the two groups was similar, about 7%, most often due to miscarriage or moving from the area. The women who dropped out of the intervention group had a greater sense of personal control ($p = 0.009$), were more educated ($p = 0.002$), and had enrolled in the program earlier in their pregnancies ($p = 0.02$).

There were a number of significant differences in knowledge about and utilization of community resources, smoking behaviors, nutritional practices, and social support between the two groups. There were no differences in the number of prenatal visits, nor in the rate of LBW between the comparison and nurse-visited groups as a whole. Differences in rates of LBW were apparent for young adolescents. Among the 28 adolescents aged 14-16 in the intervention group, there were no LBW infants, compared to an incidence of 11.76% among the 17 controls. Conversely, the LBW rate among the 71 nonsmoking nurse-visited participants older than 16 years of age was 10.57%, versus 0% for the 72 nonsmoking women in the comparison group. The authors explained the result by noting that the women older than 16 years were less securely embedded in a helpful kin network, and had less confidence that someone would accompany them to labor and delivery, than were other women in the study. The authors posited that the intervention is effective for young adolescents who are enrolled in the program early in their pregnancies. They cautioned that the sample size in this young adolescent group was small, and the result needs to be replicated.

The ability to generalize the results of this study is limited by the absolute racial homogeneity of the sample, and its location in a rural area of upstate New York. As a research project, this intervention had resources available to it that may not be available to typical settings, which also limits generalizability. For instance, smoking status was determined by cotinine assay rather than self-report. It is unlikely that this test would be used in a typical clinical protocol.

In the second study, Oakley, Rajan, and Grant (1990) report the effects of a randomized trial of the Social Support and Pregnancy Outcome project, conducted at four hospitals in Britain in 1986 and 1987. Five hundred and nine pregnant women with a prior history of spontaneously delivering a LBW infant were recruited before 24 weeks of gestation into the program. Two hundred and fifty-five women were randomized into the treatment group, and 254 into the comparison group. The groups were comparable. The mean age was 28 years, and the women were predominantly working class. Forty percent of them smoked, 20% had no partner living with them, and 20% had an unemployed partner. Five percent of the women were of Afro-Caribbean or Asian ancestry.

The intervention consisted of nondirective social support offered by a nurse midwife during at least three home visits at 14, 20, and 28 weeks of gestation. In practice, the timing of the visits was later than intended because the women entered prenatal care later than the study's designers had anticipated. The mean gestational age at recruitment was about 15 weeks. The mean gestational age at the first visit was 17.8 weeks, the second visit at 24 weeks, and the third at 29.7 weeks. Two phone contacts or brief home visits were provided between these times. In addition, the midwives were on call by beeper to the participating women 24 hours a day. The visits were guided by semi-structured interview schedules to open up topics for consideration and discussion. But the midwives gave advice or information about specific topics only when asked, and did not provide any direct clinical care. Referrals to prenatal care or social service were offered as needed.

Medical records and data generated in the course of the study, such as notes after each contact and a mail-back postpartum, comprised the evaluation data. Attrition of subjects due to diagnosis of multiple birth, terminations, and miscarriages, left a sample size of 243 in each group.

Treatment mothers were significantly less likely to require hospital admission during the pregnancy and received significantly fewer epidurals during labor. The authors did not speculate about what element or elements of the intervention effected this results. There was no difference in the number of prenatal visits between the treatment and comparison groups, nor was there a significant difference in the rate of LBW among the two groups. The author posited that the intervention was unable to supersede the persistent effects of social disadvantage in these women. Another possible explanation for the lack of effect on LBW is the nondirective nature of the intervention, which was not designed to effect behavioral changes that may impact LBW, such as a reduction of smoking (Olds & Kitzman, 1993).

Larson and Watkins and their colleagues reported a community-based program which included a significant number of Mexican Americans (Larson, McGuire, Watkins, & Mountain, 1992; Watkins, Larson, Harlan, & Young, 1990). Between 55% and 80% of the women served by the program in any one year were Mexican American. Other program participants were white, African American, or Haitian. The program was implemented in collaboration with the School of Public Health at the University of North Carolina at Chapel Hill, at a migrant health center in North Carolina in 1984.

The primary interventions in this nurse-managed program included: outreach and early case-finding; linkage and coordination of the migrant center's programs with other health and social service agencies in the community; development of a multi-state tracking system; and a health education program to train migrant women as lay health advisors or *promotoras*. After training, the *promotoras* assisted with case-finding and outreach. All project staff -- public health nurse, nutritionist, nurse health educator, and social worker -- were bilingual in English and Spanish.

The most recent report of the effects of the program was conducted between 1985 and 1989, and included 559 pregnant farmworker women (Larson, McGuire, Watkins, & Mountain, 1992). The study design was descriptive and used medical record data to examine trends in the clinic's client population, rather than comparing their clients' outcomes to those of a specific comparison group.

Utilization of prenatal care increased significantly over the study period. The percentage of women entering care during the first trimester increased from 35% in 1985 to 51% in 1989, and the numbers receiving nine or more prenatal visits increased from 24% to 53% ($p = 0.009$). A nonsignificant decrease in the LBW rate was apparent, even after adjusting for race. The authors posited that eliminating barriers to care, especially language and transportation, combined with meticulous tracking and follow-up, were responsible for the positive outcomes of this intervention project.

The project demonstrated that care coordination and tracking across county and state boundaries can improve continuity of care. Remarkably for a program serving this highly transient population, only 16% of the 500 women tracked for pregnancy outcome were lost to follow-up. It was determined that the women lost to follow-up were demographically similar to the women for whom data were available. The authors remarked that future studies should assess the adequacy of prenatal care with a standard index such as the Kessner.

Summary of community-based nursing interventions. Overall, the results are modest. Only one study reported improvement in prenatal care utilization, although no standardized index of adequacy was used (Larson, McGuire, Watkins, & Mountain, 1992). One study reported a lower LBW rate, but only among adolescents (Olds, Henderson, Tatelbaum, and Chamberlain (1986). In the two studies which offer hypotheses about the elements of the comprehensive interventions which contributed most to their effectiveness, the themes of targeting care to primiparous adolescent populations and coordinating care across agencies are repeated.

As in the studies reviewed in the previous section, the primary limitations are noncomparable study groups and the potential effects of variables such as income and source of payment for care which couldn't be controlled. The difficulty of obtaining comparable groups is underscored by the fact that two of the three studies in this section used random assignment to treatment and comparison groups, yet were compromised by groups that were nonequivalent. Again, generalizability to the current effort is limited by lack of data concerning Hispanic and Mexican American populations, and by geographical setting, as the one study with significant numbers of Mexican Americans was conducted in North Carolina.

Community-Based Interventions By Nonnurses

This section reviews six studies which describe social interventions involving outreach, home visitation, and patient advocacy carried out by nonnurses. In five of the studies, community health workers indigenous to the community acted as cultural brokers to facilitate relations between the pregnant women and the health system (Jezewski, 1990). In the sixth study, trained social workers provided the intervention.

Heins, Nance, and Ferguson (1987) evaluated the effects of the Resource Mothers program, a Robert Wood Johnson-funded social intervention program targeted at, but not limited to, adolescents in South Carolina between 1981 and 1985. The Resource Mothers program hired and trained six women recruited from the community. They fulfilled five roles -- teacher, role model, reinforcer, friend, and facilitator -- during home visitations to pregnant adolescents for up to a year after delivery. Resource Mothers also provided transportation to health care and social services as needed. Each Resource Mother carried a case load of about 30-35 teens, which included both antepartum and postpartum clients.

The analysis examined birth certificates of the 575 Resource Mother participants who were primiparas, less than 19 years old, living in the project area with singleton births, out of a total of 753 Resource Mother participants. The rationale for excluding the nonadolescent and multiparous participants from the sample was not given. The selected subsample of participants was matched to the birth certificates of an equal number of primiparous women residing in nearby counties by year of delivery, age of mother, race of child, and sex of child. Matches were not available for ten of the women, leaving a sample size of 565. One of the unmatched cases had a LBW infant. The study population was 89% African American and 93% were single. The birthrate, adolescent birthrate, and rates of LBW, neonatal and infant mortality, poverty, and inadequate prenatal care of the comparison counties appeared roughly comparable to the Resource Mothers Group. Yet no attempt was made to assess the comparability of the treatment and comparison group samples. It is notable that marital status was not used in the matching process, nor was it available in the county-level data.

The definition of adequate prenatal care in this study was similar to but not identical with the Kessner index; five or more prenatal visits, or care begun before the seventh month of pregnancy. In the treatment group, 81.9% received adequate prenatal care, compared to 64.1% of the comparison group (p = .000). They also had a 10.6% rate of LBW, compared to 16.3% of the controls (p = 0.006). The authors stated that it was unclear to what extent the improvement in LBW was the result of improved prenatal care, or to the social support provided by the program. They presented theoretical and empirical evidence from other studies about the effectiveness of social support.

The authors recommended that future studies should use the Kessner index to facilitate the comparability of results with those of other studies. It would be interesting to know the prenatal care utilization patterns and pregnancy outcome data for the 108 nonadolescent multiparas who were excluded from the analysis.

Another program primarily directed to African American women was notable for using a case management approach

(Poland, Giblin, Waller, Jr., & Hankin, 1992). Social support services were provided by trained Maternal Child Health Advocates in Detroit from April 1986 to March 1988. The advocates were recruited from the community, and in the past had received public assistance and had attended public prenatal clinics. They were supervised by a nurse or social worker.

A random sample of 650 women receiving prenatal care at Hutzel Hospital and living in Detroit were assigned an advocate. Advocates conducted home visits and used a case management model to assess need for help with tangible necessities such as housing and food; informational needs about medical conditions, nutrition and community resources; and support and counseling for feelings of fear, depression, and other problems. Advocates made referrals where necessary and accompanied their clients to appointments when needed.

Of the 650 women enrolled in the program, 147 saw an advocate through delivery. The 107 women who refused treatment were more likely to be white and married. The 169 women who started the intervention and then dropped out were more likely to be younger than the other women. Advocates were unable to make contact after three attempts with 227 women. One hundred and eleven women had three or more contacts with the advocate and had a singleton delivery; these women formed the intervention group. A comparison sample, drawn from hospital prenatal clinic attendees, was similar to the intervention group in race, age, parity, medical risk, employment and marital status. Medical record data were used to compare Kessner scores and birthweight.

The study found that the intervention group had better Kessner scores with a significant difference in the number of prenatal visits, 8.0 in the treatment group versus 6.5 in the comparison group. There was also a significant difference in birthweight between the two groups, with the intervention group having babies weighing 148 grams more than the control group. However, this difference is not clinically significant. The incidence of LBW in the sample was not reported, but it is likely that the final sample was too small to make statistical inferences about the incidence of LBW.

A regression analysis which measured effects of the number and type (home visit, phone, or case management activities) of advocate contacts against the Kessner score, demonstrated that the greater the intensity of services, the better the Kessner score (*p* = 0.05). The authors indicated they were not certain about what aspect of the advocates' activities contributed to the positive effects on birthweight.

The authors reported that there were advantages in employing advocates who shared a common culture and lifestyle with clients. But they also noted problems with turnover, supervision, and record-keeping while implementing the intervention. They suggest that future studies examine the relative efficacy and/or synergistic relationships between paraprofessionals and professionals to determine the optimal mix of personnel (p. 229).

Another program which featured nonnurse community health workers was the *Dar A Luz* (Giving Birth) program, which was targeted at Mexican Americans (Carrillo, Pust, and Borbon, 1986). Implemented in cooperation with medical faculty from the University of Arizona in Tucson in 1980, the program recruited and trained bilingual volunteers to act as patient advocates. After receiving training in communication skills, patient rights, lab tests and procedures, and childbirth education, each volunteer was matched with a pregnant woman, whom they followed throughout their pregnancies and into the postpartum. Advocates often accompanied the women through labor and delivery.

The program also arranged with a local community clinic to provide a weekly prenatal clinic staffed by a physician and nurse-midwife. Childbirth education classes were offered in the waiting room at each clinic session, and attendance was required of each program participant. The program was never able to procure a formal arrangement for inpatient services for their clinic population. *Dar A Luz* served 274 women during its first three years. The report by Carrillo and his colleagues didn't provide data to evaluate the effects of the program.

The fourth program, *Un Comienzo Sano*/Healthy Start, recruited and trained paid *promotoras* to provide care in three farming communities along the U.S.-Mexico border in southwestern Arizona in 1988 (Warrick, Wood, Meister and DeZapien, 1992). The *promotoras* recruited pregnant and parenting women from their communities and conducted two 12-week prenatal courses. *Promotoras* also made home visits, provided transportation to classes, and helped participants enroll for prenatal services at public agencies. They served as teacher, friend, and advocate.

Three kinds of data were collected to evaluate the project. Structured interviews were conducted with project staff and health providers. Ethnographic interviews were conducted among the project participants. Finally, survey data were collected by the *promotoras* at program intake and again after delivery.

Eighty-two pregnant women participated in the program over a ten month period. Fifty three percent of the project's participants reported starting prenatal care in the first trimester, and 47.4% had ten or more prenatal visits. The LBW rate among the project participants was 2.4%. One pregnancy ended in stillbirth. The program was not evaluated against any comparison group, nor was the incidence of LBW in the state or county population as a whole cited. Survey data indicated that multiparous project participants reported easier labors, increased well-being, and increased communication with their partners compared with previous pregnancies, as a result of the prenatal education. The participants also reported that they appreciated the support and encouragement of the *promotoras*.

The fifth program, *De Madres A Madres*/Mothers to Mothers, was started in Houston, Texas in 1989 (McFarlane, 1996; Rodriguez, McFarlane, Mahon, & Fehir, 1993) with funding from a March of Dimes grant to nursing faculty at Texas Women's University. The program is a community coalition of volunteer mothers working in partnership with local schools, businesses, churches, health and social service agencies, and the media to increase community awareness about the importance of prenatal care (Rodriguez, McFarlane, Mahon, & Fehir, 1993, p. 403). Volunteer mothers conduct outreach and provide home visits to pregnant women, and advocate for more accessible services to the media and in front of the city council, public officials, and hospital administrators.

Further funding from the Kellogg Foundation in 1991 allowed the establishment of the *De Madres a Madres* Center in the neighborhood, which provides space for an information clearinghouse, volunteer training, a craft and catering business. There were 50 active volunteers in 1993, and volunteer mothers followed 221 pregnant women. Since the beginning of the program in 1989, not a single LBW baby has been born to a woman followed by a volunteer mother. In the catchment area, infant mortality has decreased from 16.5 per thousand in 1989 to 11.4 in 1993 (McFarlane, 1996).

The final study in this section, by Villar, Farnot, Barros, Victoria, Langer, and Belizan (1992), evaluated the effects of a program of home visits designed to provide psychological and social support to high-risk pregnant women. The study was conducted from 1989 to 1991 at four hospital centers in Mexico, Brazil, Argentina, and Cuba. The study was funded by the International Development Research Center in Ottawa, Canada.

The intervention was targeted to women who had one or more characteristics that put them at higher than normal risk of delivering a LBW infant. These characteristics included: previous delivery of preterm or LBW infant; age less than 18 years; body weight less than 50 kilograms; height less than 1.5 meters; low income relative to local standards; less than three years of education; cigarette smoking; heavy alcohol consumption; and residence apart from the infant's father. Women who started prenatal care after 22 weeks gestation, who were carrying a multiple gestation, or who had a history of major mental illness, cervical cerclage, or Rh isoimmunization, were excluded from the study.

Of the 5,590 women screened, 2,235 women met the inclusion criteria and agreed to participate in the study. They were randomly assigned to either an intervention group or to a comparison group which received only customary care. There were 1,115 women in the treatment group and 1,120 women in the comparison group. The treatment and comparison group appears to have comparable numbers of women at risk due to previous delivery of preterm or LBW infant, age less than 18 years, body weight less than 50 kg or height less than 1.5 meters, low income, less than three years of education, cigarette smoking, alcohol use, and residence apart from the infant's father. Demographic variables, such as martial and employment status, parity, education, history of previous cesarian delivery, and interval since last delivery, were also comparable. Psychosocial factors measured at intake, such as feeling bad about the pregnancy, bad relationship with partner, high psychological distress level, and low social support level, were also similar between the two groups.

The intervention was delivered by specially trained female social workers in Argentina, Brazil, and Mexico, and by obstetrical nurses in Cuba. Four home visits were made at or near 22, 26, 30, and 34 weeks of gestation. Two more visits were made if the pregnant woman or study staff felt they were needed. The visits lasted between one and two hours. The content of the visits were guided by a study protocol and manual with suggested activities and situation-specific interventions.

The main objective of the visits was to strengthen the pregnant woman's support network. Each participant was encouraged to identify and select a support person to share in all the intervention activities. The support person was encouraged to motivate and assist the woman throughout her pregnancy with decision-making, problem resolution, health behaviors, and prenatal care. The first part of each visit was devoted to allowing the pregnant woman and/or her partner to discuss her pregnancy, especially any changes, doubts or worries. This discussion formed the basis for the home visitor to select and adapt themes from the study protocol. The intervention group could also drop in on or phone a special support office at each hospital if they had problems between scheduled home visits. Participants were given tours of the emergency and labor and delivery departments of the hospital. Participants were also given health education about nutrition, smoking, and drug and alcohol abuse. Eighty-three percent of the participants received the planned number of home visits. The participation of the support person in the visits decreased progressively over time, with 66% present at the first visit and 52% present at the fourth visit.

The source of data for the analysis was medical records. There were no significant differences between the treatment and comparison groups in number of visits for prenatal care or LBW. The number of prenatal visits was 8.1 ± 3.7 for the comparison group and 8.0 ± 3.8 for the intervention group. The rate of LBW was 8.7% on the treatment group and 9.4% in the comparison group. Adjustments for smoking, parity, obstetrical history, alcohol use, study site, levels of psychological distress, and levels of social support, did not alter the LBW results.

The authors concluded that the execution and intensity of the intervention were optimal within the constraints inherent in public service institutional setting, but were still insufficient to overcome a lifetime of disadvantage and poor health. They speculated that women who had inadequate prenatal care may have greater needs and might have received more benefit from the intervention. They also hypothesized that interventions which are more long term, more individualized, and focus on psychological treatment, resolution of social and family problems, and nutritional supplementation, may be more effective than the intervention as it was designed.

The study is difficult to evaluate as published. The report aggregated the data from the four centers and did not indicate the number of women at each center. It would be interesting to know the specific results for the Mexican sample. Details of the linear regression analysis, such as procedures and Beta weights, were not reported. Analysis for interaction effects was not mentioned.

<u>Summary of community-based interventions by nonnurses.</u> Again, the findings from the six studies are modest. The reports of the *Dar a Luz,* the *Comienzo Sano*, and the *De Madre a Madre* projects are purely descriptive. The study of the Maternal Child Health Advocate program showed some improvement in prenatal care utilization, but the generalizability of the study is limited by its predominantly urban, African American sample. The Resource Mothers program showed dramatic effects on prenatal care

utilization and rate of LBW, but the generalizability of the study results is limited to unmarried African American adolescent primiparas.

In contrast, the Latin American trial studied a population similar to the population of interest in this dissertation. But the effects of the intervention on the utilization of prenatal care and the rate of LBW were statistically insignificant. It is interesting to note that the Resource Mothers program was designed to offer long term support during pregnancy and through the infant's first year. This longer term support was one of the suggestions made by the authors of the Latin American study for increasing the effectiveness of the intervention. The Resource Mothers program also provided tangible assistance to the participants in the form of transportation to health care and social services. Such tangible support was not available to the women in the Latin American study.

Summary of Programs to Improve Utilization of Prenatal Care

Nine of the reviewed studies showed some success in improving the utilization of prenatal care, as measured by the number of prenatal visits or by the Kessner index

(Heins, Nance, & Ferguson, 1987; Kay et al, 1991; Larson et al, 1992; McLaughlin et al, 1992; Peoples, Grimson, & Daughtry, 1984; Peoples & Siegel, 1983; Piper, Mitchel, Jr., & Ray, 1996; Poland et al, 1992; Strobino et al, 1986). And eight reviewed studies showed improvement in the rate of LBW, particularly among adolescents, African Americans, and/or primiparas (Bahry, Fullerton, & Lops, 1989; Buescher et al, 1987; Heins, Nance, & Ferguson, 1987; Korenbrot, 1984; Leppert & Namerow, 1985; McLaughlin et al, 1992; Olds et al, 1986; Peoples & Siegel, 1983).

There appears to be little consensus about which elements of the comprehensive interventions were responsible for positively influencing prenatal care utilization and the rate of LBW. None of the studies featured designs which would allow such an analysis. Yet, three themes do emerge from this literature. The first is the relative success of targeting services to those most likely to benefit from them. The second is the effectiveness of individualized tangible support in overcoming barriers to prenatal care. The third theme is the usefulness of coordinating care by improving the linkages between agencies, or by assigning individuals to broker and/or facilitate access to multiple services. Each of these themes will be explicated below, along with how they apply to the situation of Mexican Americans. In addition, a brief discussion of the methodological problems apparent in the literature will be presented, and gaps in the literature that will be addressed by the proposed study are presented.

The first theme concerns targeting services to those who are most likely to benefit from comprehensive prenatal care services. In the studies reviewed above, the populations most positively affected by the interventions were African Americans, adolescents, and/or primiparas. Several authors have advocated, therefore, that services be concentrated on women from these groups. It can be argued on a theoretical basis that Mexican Americans be added to this list because they have characteristics similar to African Americans such as low income, lack of third party coverage, low levels of education, and high parity with short birth intervals, that put them at increased risk of LBW. Yet there is a paucity of empirical data about the effectiveness of interventions designed to facilitate comprehensive prenatal care targeted to the Mexican American population. The reports of the *Dar a Luz*, the *Comienzo Sano*, and the *De*

Madre a Madre projects were purely descriptive. Only two studies were found that had a comparison group: the CPP (San Diego) and North Carolina migrant clinic studies. No studies of randomized trials were located which included Mexican Americans in the sample.

Other authors have suggested targeting services to women with specific risks amenable to change. The most common of these risks are cigarette, drug, and alcohol use. As discussed earlier in this review, the prevalence of substance use and abuse among Mexican American women is lower than in the general population. While this should not preclude providing such interventions to the segments of the Mexican American population that would benefit from them, the aggregate data do not point to a special need for these kind of services.

The second theme, the effectiveness of tangible support, was raised by Olds and Kitzman (1993). They propose that one explanation for the lack of program effects is incorrect underlying assumptions. For instance, two studies were predicated on the theoretical linkage between social support, stress reduction, and favorable physiological effects on the fetus (Oakley, Rajan, & Grant, 1990; Villar et al, 1992). The intervention in these two studies provided nondirective social support, health education, and referrals as needed. No significant differences were found in prenatal utilization or the rate of LBW. Interventions which offered tangible support, such as assistance with transportation to appointments and help negotiating the social service system (e.g. Heins, Nance & Ferguson, 1987), were more likely to effect positive outcomes.

Another theme apparent in this literature is that coordination of prenatal care and services contributed to the effectiveness of the interventions. In some of the programs, this coordination was effected through multidisciplinary care teams. In others, several different kinds of services were offered by one program, offering "one stop shopping" and ease of access. In yet others, coordinated systems of referral, tracking, and follow-up facilitated the coordination of care. Nursing case management is another mode for coordinating care that has received increasing attention in the past few years, but only two studies were found which evaluated nursing case management for the pregnant client (Piper, Mitchel, Jr., & Ray, 1996; Poland et al, 1992).

Several methodological problems were common to most of the literature. The studies' findings were often compromised by comparison groups that were not described at all, or were clearly at higher risk. Even in the studies where the comparison groups were comparable on the matched variables, other potentially relevant intervening variables such as income, smoking history, or substance abuse, were not always considered in the analyses. These variables are not always included on birth certificates, and may not have been available for analysis.

None of the study designs was able to control for self-selection to prenatal care as a plausible rival hypothesis to explain differences in prenatal care utilization and LBW rates. Prenatal care and enhanced services may prevent complications that require medical attention by changing health behaviors. On the other hand, women in these programs who have early signs of pregnancy complication may have been more likely to seek medical attention. Studies are needed which sort out these influences in both outpatient and inpatient prenatal medical care (Olds & Kitzman, 1993).

The intervention literature demonstrated a wide variety of program goals, content, and service providers. In many studies about social support and home visitation, it was difficult to determine what comprised the intervention. When multiple providers or an interdisciplinary approach was used, it was sometimes difficult to ascertain who did what. Often, the intensity of services, such as the number or length of visits provided, was not described. The general consensus seems to be that more visits were more effective, a linear "dose"/effect relationship (e.g. Poland et al, 1992). As applied research endeavors, many of the studies demonstrated a tension between standardized and individualized strategies and plans of care.

The generalizability of the current literature to the Mexican American population is limited by the lack of studies which include Hispanic and Mexican American populations. Another limitation is that many studies were conducted in the South, whereas the largest Mexican American population lives in the Southwest.

Conceptual Framework

There is very little discussion in the intervention literature about conceptual issues. Indeed, only three of the studies reviewed above included a conceptual framework or discussed theoretical assumptions. The primary theoretical debate in the limited literature about Mexican Americans and prenatal care utilization is about whether inadequate health care is a result of cultural differences or poverty.

The conceptual framework developed for this study has four elements: the Community Environment, the Client's Situation, the Intervention, and the Outcomes. Each element is discussed below. Figure 1 illustrates the relationships between the elements.

Community Environment

The community environment is the setting in which the ROMPP intervention was implemented. The rationale for including this element comes from the literature cited previously, which documents the influence of the characteristics and organization of the health care and social service system on the utilization of prenatal care. In this study, the environment is described as fully as possible, but was not measured formally.

A key resource in the community was the prenatal care providers themselves. The goal of the ROMPP intervention relevant to this study was to increase enrollment in and utilization of the existing system of prenatal care services

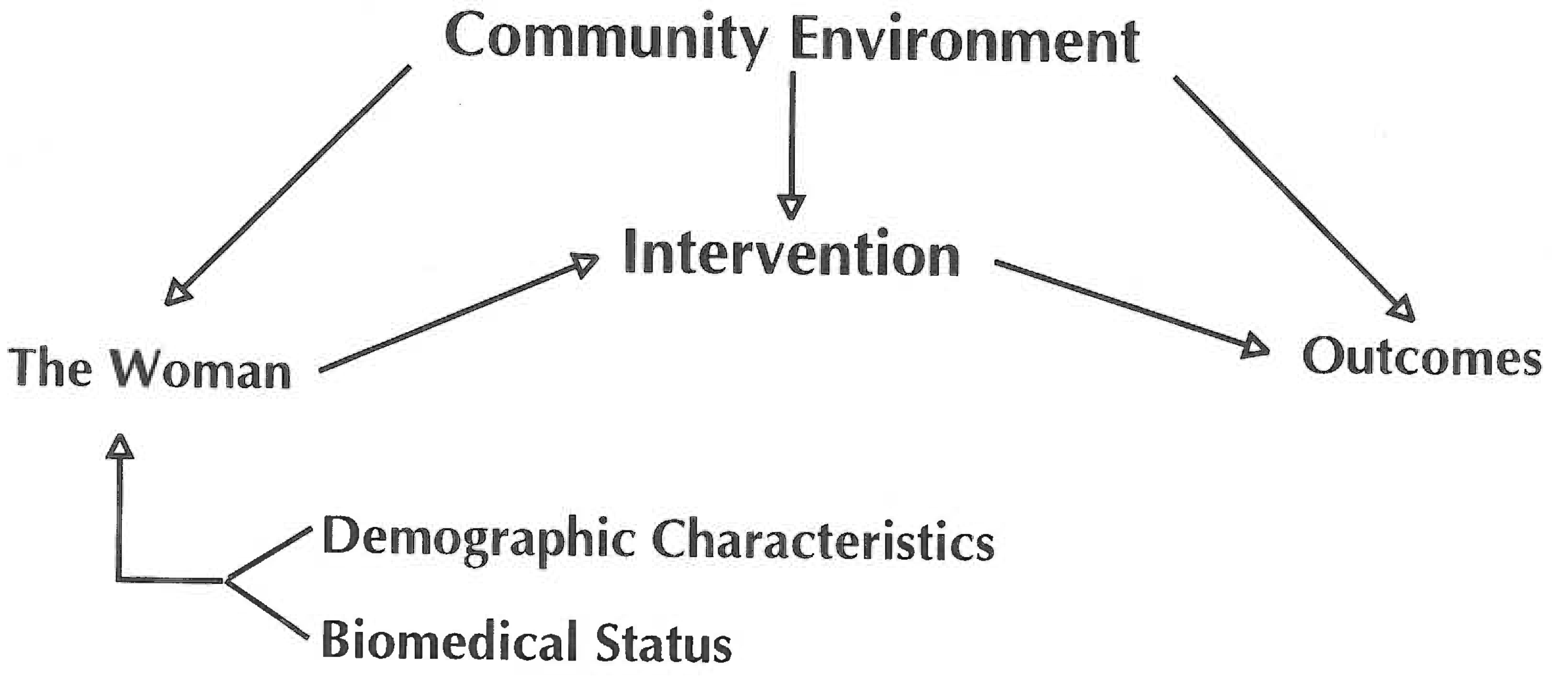

Figure 1. The conceptual model which guided this study.

in the community. The health care system in Klamath Falls had adequate capacity to absorb the projected increase in utilization. The number of prenatal care providers practicing in Klamath Falls increased over the study period from two to seven. In addition, focus group participants (Thompson, 1995) reported that in the past few years, more providers are able to communicate in Spanish or have bilingual staff, and that language issues have become less troublesome than in the past.

While ROMPP had no direct influence over the organization, quality and financing of prenatal care services, it did attempt to influence the accessibility and acceptability of prenatal care services. These efforts will be described in the section on the Intervention.

Demographic Characteristics

As mentioned in the literature review, the demographic characteristics of pregnant women are consistently found to be correlated with their utilization of prenatal care. The variables included in this study are: age, education, parity, marital status, and country of origin.

Biomedical Status

The presence of chronic illness prior to pregnancy, and/or complications arising during pregnancy are also associated with increased utilization of prenatal care. In this study, the variables considered are the presence or absence of: anemia, gestational diabetes, pregnancy-induced hypertension, renal disease, and Rh sensitization during the index pregnancy, and history of infants large or small for gestational age.

The Intervention

The conceptual framework for the ROMPP intervention was not well-developed at the time the larger study was funded. As the intervention was implemented and evolved, it became apparent that ROMPP blended concepts of culturally appropriate care, outreach, nursing case management, and home visitation. The operationalization of these concepts in the ROMPP intervention are presented below.

Culturally appropriate care. The concept of culturally appropriate care was the basis on which the other aspects of the ROMPP intervention rested (Burton & Curry, n.d.). The essence of the concept was that care should acknowledge and incorporate the beliefs, values, and health practices of the client's native cultures. Provision of culturally appropriate care is problematic in situations where clients are members of a minority group, and receive health care in settings dominated by the cultural majority.

One way to bridge the cultural divide between client and provider in such a setting is through a cultural broker, an intermediary between client and provider (Jezewski, 1990). A cultural broker functions in both cultures to interpret meanings of behaviors, customs, and events to both parties, facilitate communication, and enable cooperation towards a common goal. Typically, a cultural broker is a native member of minority community, who through life experiences has come to understand the dominant culture. She is often bilingual and bicultural. Ideally, she would be a trusted and respected member of the community, and have a wide network of contacts among community members.

Outreach. The role of the cultural broker in ROMPP was formalized as "outreach worker." Outreach may refer to a broad range of activities. Outreach in ROMPP was conceptualized as having three basic activities: (a) case-finding and recruitment; (b) follow-up to ensure continuity of care; and (c) advocacy to lower barriers to care. The first function was relatively straightforward: finding and enrolling pregnant women who were not already receiving prenatal care. The second function was follow-up to maintain continuity and reduce social isolation. This was accomplished by phoning or visiting clients at intervals to monitor progress and problems, tracking needs and services, encouraging and motivating continued participation, and reinforcing health education. In the third function, the outreach worker served as advocate, seeking to increase accessibility by lowering and/or removing barriers to seeking care, including cultural, social, and language differences, problems with finances and transportation, lack of knowledge, and lack of trust. This conceptualization of outreach as advocacy has been described by Bray and Edwards (1994) among Hispanic outreach workers in a project to improve prenatal care utilization in DuPage County, Illinois.

The outreach worker also sought to improve the acceptability of prenatal care to ROMPP women by facilitating communication and interpreting cultural expectations between client and provider. For instance, the outreach worker helped ROMPP participants and their families to understand the advice given by providers. One mother of a ROMPP participant recounted her concern when her pregnant daughter had been frequently napping during the day. She worried that too much rest would make the baby "get stuck" and result in a difficult birth, a common *mestizo* belief. She had asked the provider for a medicine to help her daughter stay awake and had been rebuffed. The outreach worker was able to explain the daughter's need for rest and allay the mother's fears about a difficult birth (Thompson, 1995).

It should be acknowledged that there are other aspects of culturally appropriate care, such as positive provider attitudes towards the pregnant woman's cultural heritage, the provision of culturally appropriate educational materials, and the negotiation of culturally sensitive options for the plan of care. The outreach worker had little direct control over these aspects of care, and the extent to which these aspects were addressed in the relationship between pregnant woman, outreach worker, CHN case manager, and community health care provider in the ROMPP intervention is unknown.

In ROMPP, the outreach worker and community health nurse (CHN) case manager formed a working partnership to facilitate the enrollment of clients into health care services. The idea of partnership between the outreach worker and the CHN case manager to facilitate care formed the conceptual link between culturally appropriate care and nursing case management.

Nursing case management. ROMPP's nursing case management emphasized the facilitative and advocate aspects of community-based nursing case management. ROMPP staff contacted clients in their home, at their workplace, and in health care agencies to assess, plan, implement, and evaluate nursing care, and to facilitate and coordinate client care by multiple health care and social service providers.

The CHN case manager was primarily responsible for assessment, planning, coordination, and evaluation of care. She assessed the client's personal and social resources, and considered her biomedical status. In addition, she was familiar with the characteristics of the resources and services available in the community. The CHN case manager worked with the outreach worker to implement the plan of care, and facilitate the client's interaction with community providers of social, health, and obstetric services, particularly with prenatal care providers and WIC.

The CHN case manager did not have primary responsibility for carrying the cultural aspect of the intervention. Nonetheless, she was well-known among community health care providers for her concern about the needs of the Mexican American community in Klamath Falls. She knew some Spanish and was observed to express appreciation for Mexican American cultural values like familism and respect for elders.

Home visitation. Olds and his colleagues (1986) presented conceptual premises for home visitation which appear to be congruent with the latent premises on which ROMPP was operationalized. The Olds et al framework posits that home visitation can be an effective means to accomplish four related goals. First, home visitation can be a means to inform and motivate women who are unaware of or reluctant to use community health and human services. Second, home visitation is a way to provide care which responds flexibly to life circumstances. In the ROMPP Mexican American population, these included low and seasonal income, the effects of immigration, geographic isolation, and minority status.

Third, home visitation can improve health habits and behaviors. In ROMPP, these included interventions directed at optimizing nutrition, elimination, sleep and rest, activity and exercise, knowledge about self-care, health care, and community resources, interpersonal relationships, coping and stress management, and personal values. ROMPP put special emphasis on early enrollment in prenatal care, and continuation of services in an appropriate and timely manner throughout pregnancy.

Fourth, by means of the first three premises, home visitation can theoretically decrease the rate of LBW, which was the ultimate goal of ROMPP. Heins, Nance and Ferguson (1987) provide a possible linkage between the first three premises and infant birthweight. They propose that formal and informal social support may buffer stress and attenuate the physiological changes associated with stress, such as decreased uterine blood flow and increased uterine irritability. In addition, health education and social support have the potential to improve health habits, which can also affect birthweight. For example, participation in the WIC program has been shown to increase infant birthweight while smoking has been shown to decrease birthweight.

Outcomes

The larger ROMPP study examined biomedical and clinical outcome measures, such as birthweight, APGAR score, and transfer to NICU. This study focused on intervening or intermediate, process-oriented outcomes related to the utilization of prenatal care.

"Utilization" is another concept which is frequently employed but not consistently defined in the literature. This study examined the adequacy of prenatal care utilization, patterns of utilization of other health care services during the prenatal period, and the patterns of utilization of screening glucose tolerance tests. Conceptual definitions of these phenomena are presented below.

Prenatal care. Prenatal care is a series of biomedical, educational, and psychosocial interventions administered at intervals throughout a pregnancy (Nagey, 1989).

Adequacy of prenatal care. Adequacy of prenatal care is defined according to the current standards of the American College of Obstetrics and Gynecology (1992). These standards specify that adequate prenatal care starts in the first trimester. The standards also prescribe one visit per month through 28 weeks of gestation, one visit every two weeks through 36 weeks, and one visit each week thereafter until delivery. Underlying assumptions are: (a) earlier prenatal care is more adequate prenatal care; and (b) more frequent visits are better than less frequent visits.

Utilization. Utilization of prenatal care is defined as an episode of care when a pregnant woman presents for and receives prenatal care from a health care provider. Operational definitions of utilization in this study included "visit" and "inpatient admission."

Pattern of utilization. Pattern of utilization refers to the presence or absence of episodes of care during the pregnancy, the timing with which particular episodes occur, and the distribution of episodes of care throughout the pregnancy.

Summary of Conceptual Framework

The conceptual framework used in this study included concepts of Community Environment, Demographic Characteristics, Biomedical Status, the Intervention, and Outcomes. The rationale for inclusion of Community

Environment, Demographic Characteristics, and Biomedical Status comes directly from the literature on correlates of prenatal care utilization.

The ROMPP intervention combined the concepts of culturally appropriate care, outreach, home visitation, and nursing case management with the goal of improving the utilization of prenatal care. The rationale for inclusion of these conceptual elements in the intervention comes from the literature about interventions to influence prenatal care utilization. The method by which these concepts were operationalized by the community health nurse case managers and the outreach worker (cultural broker) will be described in the next chapter.

The rationale for the Outcomes element of the conceptual framework is suggested by the literature, and was the focus for this study.

The Research Questions

The overarching question guiding this study was: Did ROMPP improve patterns of prenatal care utilization by rural pregnant Mexican American women, compared to Mexican American women who did not receive the intervention?

1. Did the treatment group more adequately utilize prenatal care than the comparison group? ROMPP women were expected to have more adequate prenatal care than women in the comparison group.

    (1a) Did the treatment group initiate prenatal care earlier in their pregnancy than the comparison group?

    (1b) Did the treatment group have a more adequate number of prenatal care visits than the comparison group?

    (1c) Did the treatment group have different patterns of utilization of prenatal care? Specifically, were prenatal visits distributed throughout the pregnancy in a more appropriate way in the treatment group than the comparison group? ROMPP women were expected to have prenatal visits distributed more evenly throughout pregnancy than the comparison women.

2. Did the treatment group have better patterns of utilization of other health care resources?

    (2a) Did the treatment group have fewer visits to the emergency room during pregnancy than the comparison group? ROMPP participants were expected to have fewer ER visits than women not in ROMPP, since the ROMPP women should have had better access to a regular health care provider in a nonemergent outpatient setting for these type of services.

(2b) Were there differences between the treatment and comparison groups in the diagnoses associated with these visits?

(2c) Did the treatment group have fewer prenatal inpatient admissions than the comparison group? ROMPP participants may be expected to have had fewer hospital admissions, since regular and timely prenatal care may have resulted in early recognition and treatment of pregnancy complications, and the nursing support available to ROMPP participants may have facilitated management at home. On the other hand, ROMPP participants might be expected to have had more hospital admissions, since they may have had more contact with the health care system and more opportunities to be diagnosed with conditions that required inpatient management.

(2d) When admitted, did the treatment group have shorter lengths of stay than the comparison group?

(2e) Were there differences between the treatment and comparison groups in the diagnoses associated with these admissions?

3. Did the treatment group have better patterns of utilization of prenatal screening tests? Specifically, were they more likely to have screening serum glucose tests before 29 weeks of gestation? Because they should have had earlier and more consistent prenatal care, more ROMPP women than comparison women were expected to have a timely screening serum glucose test.

METHODS

In this chapter, the methods used in the study are presented. First, the study design is outlined and the setting of the study, Klamath County, is described. Then, the sample is specified and the intervention is described in detail. Next, the study variables are delineated, and their reliability and validity are assessed. Then, procedures for data collection and analysis are outlined. Finally, human subjects concerns are discussed.

Study Design

This study was a retrospective analysis of a nursing case management intervention and its effect on patterns of prenatal care utilization. The study design was quasi-experimental in that random assignment to intervention and comparison groups was not possible.

The study was a secondary analysis of data drawn from a larger data set that had already been collected to evaluate the overall benefits and costs of the ROMPP intervention. The larger ROMPP evaluation study asked questions about the effectiveness of the intervention in improving birth outcomes. The larger data set included information collected from ROMPP participants during their participation in the study, birth certificate data, medical record data, and focus group data from both participants and staff. Thus, this dissertation study is a part of the larger analyses, and used only a small part of the larger data set. This author has been a research assistant on the ROMPP project for approximately three years and had significant responsibilities in data preparation and management.

At the 1995 annual meeting of the American Public Health Association, scholars in the field of prenatal care noted that the quest to find effective interventions that decrease rates of infant mortality, LBW and prematurity has been difficult (Curry, personal communication, November, 1995). The scholars agreed that the search for outcome effects should not be abandoned, but rather refocused to capture benefits that are elusive to biomedical measures. The current study explores one of these, changes in patterns of prenatal care utilization.

There were three sites at which the ROMPP intervention was delivered: two sites for Native American women and one site for Mexican American women. This study concerned only the Mexican American participants recruited in Klamath County.

The Setting

This section describes Klamath County, the setting for this study. Klamath County is located in south central Oregon, on the California border. It is very rural; with 6,135 square miles and a population of 60,500, it has an average of 9.9 persons per square mile. The largest city is Klamath Falls, with a population of 18,238. About 18.4% of the county's residents are designated economically disadvantaged by the Oregon Employment Division.

Klamath County has higher infant death rates and higher postneonatal death rates than does the rest of the state. Table 1 presents infant and neonatal mortality statistics for Klamath County compared to all of Oregon for the years relevant to this study. The rates are higher in Klamath County than in the state as a whole for all years except neonatal mortality in 1991. These data are aggregated for all racial and ethnic groups in the County, and are not available for specific ethnic groups.

While most of Klamath County's residents are Anglo, 5% of the residents are Hispanic, 4% are Native American, and less than 1% are Asian/Pacific Islanders. Of the Hispanic residents, about 80% are Mexican American. The largest part

Table 1

Infant Mortality and Neonatal Mortality Rates in Klamath County and in Oregon, 1989-1994.

	Klamath County	Oregon
1989		
Infant	14.0	8.8
Neonatal	7.7	5.0
1990		
Infant	11.6	8.3
Neonatal	8.1	4.2
1991		
Infant	9.1	7.2
Neonatal	3.4	4.1
1992		
Infant	7.9	7.1
Neonatal	4.5	3.8
1993		
Infant	13.2	7.1
Neonatal	8.4	3.7
1994		
Infant	9.1	7.1
Neonatal	5.7	3.9

Note: Rates per thousand births.

of the Hispanic population lives in the southern part of the county, where they are employed in seasonal farm work, mostly planting, harvesting, and packing potatoes.

Maternity care in Klamath County is provided by private family practice physicians, two obstetricians, two nurse practitioners, and two nurse midwives practicing in association with physicians. Three of the providers in the community speak Spanish. According to federal criteria, Klamath County is a medically underserved area, with a physician-to-population ratio of 1:749. A private nonprofit clinic in Chiloquin, in the northern part of the county, primarily serves the Native American population. The county has one community hospital, Merle West Medical Center, with 140 beds. The nearest tertiary care center is in Medford, 80 miles away, on the other side of the Cascade Mountain range.

The Study Sample

From September 1991 to May 1994, ROMPP staff sought out and recruited high-risk, low-income pregnant Mexican American women residing in the County. ROMPP staff recruited participants by approaching potentially eligible women in the potato sheds, at grocery stores, and in neighbor's kitchens. Factors which guided the determination of risk included: history of preterm or LBW infants; history of pregnancy complications, such as pregnancy-induced hypertension; substance abuse; pre-existing medical conditions; and age less than 17 years. To define "Mexican American," the ROMPP staff used the criteria of speaking Spanish or having a Spanish surname.

One hundred and twenty-four Mexican American women were recruited into the project. The mean number of weeks of gestation at recruitment was 14.4. Of these, a total of 100 women had at least three face-to-face ROMPP Community Health Nurse (CHN) visits during the prenatal period. These 100 women formed the treatment sample in this study.

There were 24 women who did not complete the intervention. Eight women moved and were lost to follow-up before the intervention was completed. Six women had spontaneous abortions. Eight women did not meet the criteria for having recieved three prenatal CHN visits. And two women refused continued participation after recruitment into the project.

Demographic data indicate that the typical Mexican American ROMPP participant was 24 years old, born in Mexico, completed six years of education, lived with the father of the baby, and had a monthly household income of about $630. Sixty-seven percent reported they were married. Only 14% spoke English, and 54% were in this country without documentation. Forty-two percent of the ROMPP participants had not yet started prenatal care when they were enrolled in the program. Only one woman reported smoking cigarettes, and she quit during the first trimester.

Using birth certificate data from the Oregon State Health Division Department of Vital Statistics, 100 women were selected to form the comparison group. A matching procedure was applied to all live births in Klamath County between 1989 and 1991, which was before the ROMPP intervention was initiated. The matching variables, in the order they were considered, were: public funding or self as payor for health care; Klamath County resident; and Hispanic ethnicity. From this pool of women, another match was drawn using the following dichotomous variables, also in the order they were entered: mothers' country of origin, in the U.S. or Mexico; age $\leq$ 18 years or $>$ 18 years; marital status, single or married; parity, nullipara or multipara; and education $\geq$ 12 years or $<$ 12 years. Information about income and language preference is not collected on the birth certificate, and so was not available for matching.

Statistical comparison of the two groups on the variables named above was carried out using Chi square. There were no significant differences in the number of teenagers, $\chi 2(1, \underline{N} = 200) = 0.385$, $p < 0.53$; marital status, $\chi 2(1, \underline{N} = 200) = 0.601$, $p < 0.44$; high school graduation rates, $\chi 2(1, \underline{N} = 200) = 1.143$, $p < 0.29$; parity, $\chi 2(1, \underline{N} = 200) = 2.716$, $p < 0.10$; or country of origin, $\chi 2(1, \underline{N} = 200) = 1.087$, $p < 0.30$. These results are summarized on Table 2. Student's t tests revealed no significant differences in the mean values for age in years, $t = 0.161$, $p < 0.87$; years of education, $t = -1.434$, $p < 0.15$; or total parity, $t = 0.087$, $p < .93$.

Cultural norms regarding what counts as a pregnancy and preferences to avoid talking about unfavorable pregnancy outcomes may have lead to under-reporting of pregnancies which ended in miscarriage, stillbirth, or neonatal demise (Burton, 1993). However, it is reasonable to assume that any discrepancies occurred in both the treatment and comparison groups. For the purposes of this study, parity was defined as the number of live births in which the infant is still

Table 2

Demographic Characteristics of the Study Sample

	Intervention	Comparison
Age ≤ 18 Years	12%	15%
% Primiparas	28%	39%
% High School Grads	10%	15%
% Married	73%	68%
% Born in Mexico	94%	90%

living, rather than the total number of live births. This number underestimates the actual number of pregnancies and births in each woman's history.

Absolute values for the education variable are also affected by cultural or social considerations. The educational system in Mexico grants a secondary school degree after ten years of education, rather than 12 years as is customary in the United States. So dichotomization of educational attainment into categories defined by 12 years doesn't reflect the Mexican system. For more accurate portrayal of educational attainment, it would have been helpful to know where each member of the sample attended school, as well as the number of years. Yet these data are not available for either group. The measure of completion of 12 years of education was used in this study to facilitate comparability with other studies in the literature. It seems unlikely that any of these factors operated differentially over time, and it is probable that the demographic data on the treatment and comparison groups were similarly affected.

The two groups were also comparable on biomedical risk factors. Women with chronic medical problems, or who have a history of complications during previous pregnancies, were expected to require more prenatal care during subsequent pregnancies than were women with no such history.

A prenatal risk/complication score was generated from birth certificate data by adding up the positive responses to eight prenatal risks and complications listed on the birth certificate. These risks and complications were: anemia; gestational diabetes; pregnancy-induced hypertension; history of birth to an infant with birthweight more than 4,000 grams; previous infant preterm or small-for-gestational-age; renal disease; Rh sensitization; and "other" diagnoses. The "other" category included conditions such as low weight gain, edema, and unspecified bacterial infections. A positive response to the category "No history available," which signifies that no prenatal care record was available to the intrapartum care provider, also generated a point. Thus, the range of the prenatal risk/complication score was from zero to nine.

Six of the risk factors -- anemia, gestational diabetes, pregnancy-related hypertension, renal disease, Rh sensitization, and "no history available" -- could have been influenced by the ROMPP intervention. To isolate any potential effects of the intervention, the scale was also computed without these variables. The modified scale included history of birth to an infant weighing more than 4,000 grams, previous infant born preterm or small-for-gestational-age, and "other" diagnoses. The range of this modified scale was zero to three.

Information to complete the birth certificate data about pregnancy-related medical risks and complications is obtained by hospital clerks from the medical record. The health care provider is consulted if the information is missing or unclear. Clerks responsible for this task at Merle West Medical Center reported that this mode of data collection has been consistent from 1989 to 1995, the time period of the study. The reliability of this information is impossible to assess.

The results of the biomedical risk analysis are shown on Table 3. Student's *t* tests revealed no significant differences in the mean biomedical risk scores between the two groups. *F* tests were also nonsignificant. This is true for the composite scale which included all nine items, as well as the modified scale which asked only about history of low or high birthweight and other diagnoses.

Table 3

<u>Mean Risk Scores and Standard Deviations</u>

	Intervention		Comparison	
Risk Score	*M*	*SD*	*M*	*SD*
All factors[1]	0.340	0.639	0.240	0.534
Short scale[2]	0.212	0.411	0.141	0.378

Note: 1. $t = 1.201$, $p < 0.2313$, $F(99,99) = 1.432$, $p < 0.0755$

2. $t = 1.260$, $p < .02093$, $F(98,98) = 1.180$, $p < 0.4138$

The ROMPP Intervention

The ROMPP intervention was designed to incorporate some of the lessons learned from the literature about community-based nursing care of pregnant women who face geographical, social, and cultural barriers to adequate prenatal care. The emphasis of the ROMPP intervention was peer outreach to pregnant rural Mexican American women, home visitation, and provision of community-based culturally appropriate nursing case management. The following description of the ROMPP intervention is paraphrased from a previous study (Burton, 1993).

ROMPP emphasized the facilitative and advocate aspects of nursing case management. The community health nurse case manager (CHN) identified clients at high risk of a poor pregnancy outcome; assessed the pregnant woman's needs; identified her options; explained the advantages and disadvantages of each option, and assisted her and her family to make informed decisions; and implemented, monitored and reassessed a plan of care (Burton, 1993, pp. 48, 50). Working with the Outreach Worker (OW), the CHN recruited the client into prenatal care and WIC, monitored her health status, provided education, and facilitated the client's interaction with community providers of social, health, and obstetric services (Burton, 1993, p. 93).

ROMPP nursing care was based on the Region X Prenatal Nursing Standards. These Standards, developed at the University of Washington School of Nursing (Barnard, 1989), provide community health nurses with an assessment tool to guide the nursing care of pregnant women. The framework for the Standards is Gordon's (1994) 11 functional categories: Nutrition, Elimination, Sleep/Rest, Activity/Exercise, Cognitive/Perceptual, Health Management, Self Concept, Roles/Relationships, Sexuality, Coping/Stress Tolerance, and Values/Beliefs. Each category includes a goal statement, expected client outcomes, assessment tasks, and potential nursing diagnoses. The ROMPP CHNs collected the assessment data using the Standards at least once, early in the intervention. They used these data to organize, prioritize, evaluate, and modify their plans for case management and nursing care.

The ROMPP CHN case managers were employed as public health nurses by the Klamath County Health Department. They received: at least 16 hours of formal orientation to the structure and delivery of the ROMPP intervention; training in use of the Region X Standards; nursing research and data management procedures; and instruction about how to complete the project's data collection instruments. In Klamath County, one CHN worked with ROMPP for the first ten months of the project. She then transferred to another ROMPP site, but not before training another CHN, who worked on the project until its completion two years later.

The bilingual and bicultural outreach worker (OW) at the Klamath County site was recruited from the community for the ROMPP project, and stayed through the duration of the project. She was a long-time and respected resident of the farmworker community who had maintained strong links to her Mexican heritage. A middle-aged mother of teenagers, she was perceived to be knowledgeable about pregnancy, childbirth, and raising a family.

She was observed to be a voice of maternal concern to young women who often felt isolated, not only because they lived in an extremely rural setting, but because they were often separated from their own mothers, sisters, and aunts who would have cared for them, particularly during the postpartum period (Thompson, 1995). To the older ROMPP participants and women in the community, she was both respectful and respected. As a high school graduate and employee of the health department, she was looked to for advice and assitance. It was obvious that the elder women felt comfortable asking her questions, and she was able to provide information, which often contradicted traditional beliefs, with tact and diplomacy.

The OW identified pregnant women in the community and recruited them into the project. She assisted the CHN in problem identification, and provided information to participants about the services available in the community. She acted as a cultural broker, sharing the participant's concerns with the CHN, and interpreting the CHN's plan of care to the participant. The OW monitored participants through face-to-face contacts at home, in the workplace, and by telephone. Such contacts took place as needed, sometimes weekly or even daily. The OW also provided transportation to prenatal appointments and other services, provided translation services, and in some instances, provided labor support.

In addition to attending the project orientation sessions described above, the OW received training in basic maternity care including: fetal development; nutrition;

health promotion; risk behaviors during pregnancy; and preparation for infant care. She received no formal training in lay health promotion. Such preparation might have been helpful, but the philosophy of the ROMPP intervention was not to provide training that was not otherwise be available in the communities where the intervention was implemented.

The working relationship between the CHN and the OW changed over time. The CHN increasingly delegated responsibilities for participant education and for project data collection as the project proceeded as the OW became more knowledgeable and comfortable in her role. In addition, the CHN and OW also considered the characteristics of the participant, her life circumstances, and her health care needs to determine how they could use their unique talents and skills to best meet her needs. For instance, if the participant spoke English, or had complications of pregnancy that required sophisticated physical assessment skills, the CHN made proportionately more home visits compared to the OW. If the participant was a very traditional Mexican woman without medical complications, the OW often provided a greater proportion of the services.

The CHN was ultimately responsible for case management, and the OW was directly accountable to her. The CHN was also responsible for developing outreach and case-finding strategies, and facilitating communication among the community's various health care and social service providers caring for ROMPP participants.

Each ROMPP participant received a minimum of three antepartum CHN visits, and one postpartum CHN visit. The number of CHN visits ranged from three to 15, with a mean of 6 contacts, in person or by phone, per participant. The number of OW visits to each participant varied, ranging between none and 54, with a mean of 15 contacts. The number of visits varied with the length of the pregnancy from recruitment to delivery, but also with the needs of the ROMPP participant. Primiparas, women experiencing social isolation because of recent immigration, women in unstable or violent relationships, and women with medical complications tended to be visited more often.

The intent of the intervention was to find and recruit women before 20 weeks of gestation. In practice, participants were recruited at any time during their pregnancy. Gestational age at the time of recruitment ranged from three to 32 weeks.

All ROMPP participants received a T-shirt imprinted with the slogan *¡Yo soy una magnífica mamá! or* "I am a magnificent mom!" as appropriate, when they enrolled in the program, and a $20 gift certificate to a local K-Mart store at the end of the postpartum visit.

Study Variables

This section presents the study variables and their operational definitions. Information about the reliability and validity of the study variables is presented in the section about Data Sources.

There were 17 dependent variables in the study in five categories. The categories were: (a) the adequacy of prenatal care utilization, corresponding to Research Questions 1a and 1b; (b) the patterns of utilization of prenatal care visits, pertaining to Research Question 1c; (c) the utilization of other health care resources, for Research Question 2; and (d) the pattern of utilization of a prenatal screening serum glucose test, for Research Question 3. There was one independent variable: participation in ROMPP.

The Adequacy of Prenatal Care Utilization

This category of dependent variable pertains to Research Questions 1a and 1b, about initiation of prenatal care and number of prenatal care visits.

Initiation of prenatal care. The operational definition of initiation of prenatal care in this study was the month of initiation of care recorded on the birth certificate.

Research Question 1a, about the adequacy of initiation of prenatal care, was answered via the Adequacy of Initiation of Prenatal Care dimension of the Adequacy of Prenatal Care Utilization index (Kotelchuck, 1994a). Data about the month of initiation of prenatal care was used to classify the initiation of prenatal care into four categories: Adequate Plus, Adequate, Intermediate, and Inadequate. Initiation of prenatal care in the first or second month is Adequate Plus; in the third or fourth months is Adequate; in the fifth or sixth month is Intermediate; and in the seventh month or later or not at all is Inadequate.

Kotelchuck (personal communication, October, 1995) provided a SAS computer program to analyze data and generate values for the APNCU index. This program was rewritten in

CRUNCH. The program included an algorithm to convert the month of initiation of prenatal care as it appeared on the birth certificate into the appropriate category of adequacy.

Total number of prenatal visits. Research Question 1b asked about the adequacy of the total number of prenatal visits. The operational definition of the total number of prenatal care visits was the number of prenatal care visits recorded on the birth certificate.

The second dimension of the APNCU, the Adequacy of Received Services, was used to assess the adequacy of prenatal care visits. Note that the APNCU uses the number of prenatal care visits to measure the adequacy of "services." In the APNCU, the Adequacy of Received Services is defined as the proportion of total number of actual prenatal visits compared to the number of visits recommended by the American College of Obstetrics and Gynecology (1992).

The data required to compute the Adequacy of Received Services dimensions of the APNCU were: the gestational age at the first prenatal visit; the total number of outpatient prenatal visits; and the gestational age at delivery. These data were all available on the birth certificate.

The computation of the Adequacy of Received Services requires four steps (Kotelchuck, personal communication, October, 1995). First, the number of expected prenatal visits is calculated, according to current ACOG standards for the timing of prenatal visits, the length of gestation of the pregnancy, and the gestational age at the time prenatal care began. Then, the number of observed visits is obtained from the birth certificate. The third step is to calculate the ratio of observed to expected visits, expressed as a percentage. The last step is to categorize the received care into one of four categories: Adequate Plus, Adequate, Intermediate, and Inadequate. If the ratio of actual to expected visits is 110% or greater, the care is categorized as Adequate Plus; if 80-100%, it is Adequate; if 50-79%, it is Intermediate; and if less than 50%, it is Inadequate. The CRUNCH APNCU program performed these computations.

Data for gestational age at delivery was missing from the birth certificate in 23 cases, 11 cases in the intervention group and 12 in the comparison group. In these cases, the value was imputed by means of an algorithm which used the sex and birthweight of the infant, as described by

Kotelchuck (personal communication, October, 1995). The sex of the infant is recorded on the birth certificate, but was not part of the data field available to this study. When the sex of the infant is missing, the algorithm assumes the infants are girls, and imputes the birthweight accordingly. So all of the imputed gestational ages in this study assumed female sex.

The APNCU algorithm is based on U.S. population norms, and is not referenced by ethnicity. The validity of this method for the current study is supported by the opinion of an expert demographer at the National Center for Health Statistics (J. Martin, personal communication, November, 1996). She stated that the Mexican American weight/gestation distribution is fairly comparable to the white non-Hispanic distribution. She said that any small differences are unlikely to have much impact, given the relatively small percent of records with missing data which required the imputation procedure. Additional evidence supporting the validity of the imputation procedure came from Flegal, Launer, Graubard, Kestler and Villar (1993). They found no advantage in predicting infant birthweight from Hispanic reference data compared to data from a large, ethnically mixed sample of Kaiser Permanente patients in northern California.

It should be noted that the two dimensions of the APNCU, the Adequacy of Initiation of Prenatal Care and the Adequacy of received Services, may be summed to provide an overall measure of the adequacy of prenatal care utilization. That operation was not performed in this study, since it did not contribute to answering the specific research questions posed by the study.

Patterns of Utilization of Prenatal Care Visits

This phenomenon was addressed in Research Question 1c. The underlying assumption was that prenatal care visits should be distributed through pregnancy in accordance with ACOG guidelines. These guidelines call for some visits early in the pregnancy and more frequent visits later. In any particular month, more visits are considered better than fewer visits.

The operational definition of a prenatal visit was the date of each visit recorded in the medical record. To measure the distribution of visits, nine variables were generated which represent the number of prenatal visits in each month of pregnancy.

The data required to assess the distribution of visits were the date of each prenatal care visit, and the infant's birth date and gestational age at delivery. The date of each prenatal visit was compared to the date and gestational age at delivery to establish the gestational age at the visit, and the total number of prenatal visits during each of the nine months of pregnancy were computed. These computations were performed by CRUNCH.

Patterns of Utilization of Other Health Care Resources

This category pertained to all five questions under Research Question 2.

Emergency room visits. Question 2a asked about the number of emergency room visits during the prenatal period. The underlying assumption was that fewer ER visits are more desirable, because fewer visits reflect better access to a regular health care provider in a nonemergent outpatient setting for prevention of prenatal complications and better care of presenting symptoms. Research Question 2b asked about the diagnoses associated with ER visits.

The operational definition of the prenatal utilization of the emergency room was the number of prenatal emergency room visits, and the diagnoses associated with each visit, recorded in the hospital medical record.

Inpatient admissions. Question 2c asked about the number of prenatal inpatient admissions. Prenatal inpatient admissions were for both pregnancy-related and nonpregnancy-related diagnoses. The most common pregnancy-related reason for inpatient admission was premature labor. Research Question 2d asked about length of stay, and Research Question 2e asked about the diagnoses associated with admissions. The operational definitions of the prenatal utilization of inpatient care were: the number of prenatal inpatient admissions; the length of stay, in days, for each admission; and the diagnoses associated with each admission, as recorded in the hospital medical record.

The Pattern of Utilization of Prenatal Screening Tests for Gestational Diabetes

Research Question 3 asked about patterns of utilization of the screening serum glucose test. Current ACOG guidelines recommend that all pregnant women receive a one-hour serum glucose tolerance test at about 28 weeks of gestation to screen for gestational diabetes. While some health care providers in the Klamath area followed this guideline, other providers ordered random or two-hour postprandial serum glucose tests to screen for gestational diabetes, in accordance with older clinical practice.

Therefore, the operational definition of the screening test for gestational diabetes in this study was the date of the first one-hour serum glucose test, or a random or two-hour postprandial serum glucose test recorded in the medical record. The random blood sugar, which is usually drawn as part of the initial prenatal blood panel to screen for preexisting diabetes, was excluded from this definition.

The operational definition of a "timely" screening test was one that was conducted before the end of 29 weeks of pregnancy. The mid-pregnancy serum glucose test screens for gestational diabetes. Performing the screening test before 29 weeks of pregnancy allows for the timely detection of an abnormal glucose metabolism, which facilitates appropriate and early intervention in gestational diabetes.

In order to compute timing of this test, the infant's birth date and gestational age at delivery was obtained from the medical record. Then, the date of the screening serum glucose test was compared to the date and gestational age at delivery to establish the gestational age at which the test was conducted, to determine if the screening test fell before the end of 29 weeks. These computations were performed via a CRUNCH program.

Data Sources

Two data sources were used in this study: birth certificates, and medical records. In this section, the reliability and validity of the variables are assessed. First, variables derived from birth certificate data are presented, followed by the variables obtained from medical record data.

Birth Certificate Data

In this section, the manner in which birth certificate data was generated by the State of Oregon is described, and some general comments about the reliability and validity of birth of birth certificate data are presented. Then the variables obtained from birth certificate data are listed, and their reliability is assessed.

Birth certificate data is collected by the state government to track demographic and epidemiologic trends over time. The information requested on the Oregon birth certificate is extensive (Appendix A).

Oregon law requires that health providers and/or institutions complete the birth certificate within seven days of a birth. At Merle West Medical Center, clerical staff from the Medical Records Department fill out the birth certificate forms, usually before the patient is discharged from the postpartum unit. When the patient doesn't speak English, the clerk relies on a family member or the AT&T Translation Service to conduct the interview.

The completed forms are submitted to the county health department, which compiles the completed certificates and forwards them to the State Office of Vital Statistics. The Office checks the information for consistency, for instance, comparing the date of the last normal menstrual period to the birth date to the gestational age. Since 1993, birth certificate data have been stored electronically to facilitate retrieval and analysis. Computer-entered data are scanned for outliers which may indicate transcription errors, and these are verified and altered if found to be inaccurate.

A few generalizations about the reliability of birth certificate data may be made. Registering a birth by filing a birth certificate is a legal requirement, and compliance is considered virtually universal. Thus birth certificate data are subject to minimal selection bias, and are often considered a "gold standard" against which other data sets are compared (Forrest & Singh, 1987). Yet, as noted in the literature review, the assumption of minimal selection bias in the case of birth certificate data from the Mexican American population has been questioned (e.g. Becerra, Hogue, Atrash, & Perez, 1991). Poor and/or undocumented women may deliver their babies with the assitance of *parteras*, lay midwives, who may not register the births. The reader may remember that this and other sources of selection bias may lead to underestimates of infant morbidity and mortality, and contribute to the "epidemiological paradox" noted among Mexican Americans.

The literature presents little formal evaluation of the reliability and validity of birth certificate data. However, the extensive use of birth certificate data in epidemiological and demographic research indicates that birth certificate data is assumed to have content and predictive validity. For instance, the use of birth certificate data to measure improvements in LBW indicates that values for gestational age and birthweight are thought to have considerable predictive validity.

Birth certificate data may have reporting biases. These depend on whether the person completing the certificate relies on the medical record, the report of the health care provider, or the woman's self-report for each datum.

Variables From Birth Certificate Data

For this study, variables from birth certificate data were used to calculate Kotelchuck's (1994) Adequacy of Prenatal Care Utilization (APNCU) index, and to calculate the timing of prenatal care visits.

Research Questions 1a and 1b concerned the initiation and number of prenatal care visits, evaluated via Kotelchuck's (1994) Adequacy of Prenatal Care Utilization index. The variables necessary to calculate the index were: the month of gestation at the first prenatal visit; the total number of outpatient prenatal visits; gestational age at delivery; and the infant's birthweight. In this study, if birth certificate data for the initiation of prenatal care or number of prenatal visits was missing, the case was excluded from the analyses. There were three such cases of missing data in the intervention group, and six in the comparison group.

There are no formal studies of the reliability or validity of the APNCU, although Kotelchuck (1994a, 1994b) presented evidence that the predictive validity of the APNCU Index exceeds that of the Kessner index. Wise (1994) presented evidence to support the content validity of the APNCU index compared to other measures of the adequacy of prenatal care utilization. The strengths of the index include its distinction between the initiation of care and the frequency of visits once care begins, its attention to utilization at the end of pregnancy, and its explicit linkage to clinic standards. It should be noted that the index does not assess content or quality of care.

To complete the portion of the birth certificate relevant to the APNCU index, clerks at Merle West Medical Center collect information about infants' birth date, sex, and gestational age at delivery from the medical record. The health care provider is consulted if the information is missing or unclear. Information about the month of the first prenatal care visit and the total number of prenatal visits is obtained from the mother. If she is unable to remember, the clerk checks the medical record for copies of the prenatal care records. If these records are not available, the clerk records the mother's "best guesstimate." This mode of data collection was reported to have been consistent at Merle West throughout the time period of the study.

Two problematic practices affect the reliability of the birth certificate data on which the APNCU is based. One arises when the hospital relies variously on mothers' report or on medical records for information about utilization of prenatal care, as is the practice at Merle West Medical Center. The other problem arises from the inherent difficulties in estimating gestational age. Each of these factors will now be discussed in more detail.

Accuracy of gestational age. Several studies document problems with the accuracy of various techniques for estimating gestational age (Alexander, Petersen, Powell-Griner, & Tompkins, 1989; Alexander, Tompkins, & Cornely, 1990; David, 1980). In fact, the accurate determination of gestational age has been described as "a major problem for which no solution is readily available" (Malloy, Kao, & Lee, 1992). Estimates of an infant's gestational age may be based on the mother's last normal menstrual period, on physical examination of the neonate, or on early second-trimester ultrasound. The current consensus seems is that the last of these is the most accurate (Kramer, McLean, Boyd, & Usher, 1988).

Unfortunately, early second trimester ultrasound is not routine in the study population and not financially accessible to every member of the sample. An overestimation of gestational age would make it appear as if the initiation of prenatal care was delayed, and an underestimation of gestational age would make it appear as if prenatal care were initiated earlier in pregnancy. It is not clear how gestational age is determined by the providers at Merle West Medical Center, or if the method has remained constant over the study period. Thus it is impossible to determine if measurement error is equally distributed between the intervention and comparison groups.

<u>Reliability of number and initiation of prenatal visits.</u> At Merle West Medical Center, information about the initiation of prenatal care and the total number of prenatal visits is obtained from the mother unless she can't remember, in which case it is collected from the medical

record or directly from the health care provider. The source of the information is not noted on the birth certificate.

Forrest and Singh (1987) found that the values for these variables depended on the source from which they were collected. Their study used the 1980 National Natality Survey to compare sources of data for the month that prenatal care was initiated by pregnant women: birth certificates, the hospital where the baby was born, the attending physician, and the mother. The hospital and physician sources were collapsed into a "medical" source in the subsequent analysis. They found that mothers tend to report earlier initiation of prenatal care and more prenatal visits than are reflected in either the birth certificate or the medical source. Discrepancies are greater among women with later initiation of prenatal care as reported on the birth certificate, and among unmarried women.

The authors hypothesize several explanations for these discrepancies. Women may be reporting the month of pregnancy they were in, rather than the months of pregnancy they had completed, or may be counting from the time they found out they were pregnant, rather than from their last normal menses. Women may report prenatal care obtained from providers other than the physician who attended the birth, or may be counting visits in which the pregnancy was diagnosed as a prenatal visit.

Thus, the accuracy of birth certificate data regarding the utilization of prenatal care is very difficult to ascertain. The reported consistency with which the clerks at Merle West Medical Center have collected this data over the study period indicates that measurement error is probably equally distributed between the treatment and comparison groups.

Finally, the infant's weight and birth date were obtained from the birth certificate, to assist the calculation of the timing of each prenatal care visit in order to answer Research Question 1c. There are no apparent reliability problems associated with these data.

Summary of variables from birth certificate data. Table 4 lists all the study variables obtained from birth certificate data. There is little formal evaluation of the reliability and validity of birth certificate data. The predictive validity of this data is apparent in the extensive literature, although somewhat less so for the Mexican American population. There appears to be little

Table 4

Study Variables, Computational Data, and Data Sources

Research Question	Variable	Response Mode	Data Source
1a	Time of first prenatal care visit	Month of gestation at first prenatal care visit to primary provider	BC
1b	Total number of prenatal visits		BC
1a, 1c, 3*	Infant's gestational age at birth	In weeks	BC
Imputation of gestational age, if missing	Infant's birthweight	In grams	BC
1c, 3*	Infant's birth date		BC
1c	Number of prenatal visits in each month of pregnancy	Date of each prenatal visit	MR
2a	Total number of prenatal emergency room visits		MR
2b	Diagnoses associated with each ER visit		MR
2c	Total number of prenatal inpatient admissions		MR
2e	Diagnoses associated with each admission		MR
2d	Length of stay	In days	MR
3	Gestational age at first serum glucose test	In weeks	MR

Note. BC=Birth certificate MR=Medical Record

* Variable used for computation only

threat of history effects because the method of data collection at the Merle West Medical Center has remained constant over the study period. The reliability of each provider's method for gestational age dating, and any differences in the method of determination of gestational age between the treatment and comparison group, is unknown. The reliability of mothers' self-report of numerous variables, including the number and timing of prenatal visits, is unknown. It is likely that measurement error was similar between the treatment and comparison groups.

Medical Record Data

Data were obtained from hospital medical records at Merle West Medical Center. No formal studies were located in the literature which assess the reliability and validity of medical record data. The large amount of research based on medical record data indicates that such data are assumed to have content validity.

There are two general problems affecting the reliability of medical record data. The first problem pertains to the presence and completeness of the record. Providers and institutions are motivated by financial and legal requirements to maintain a complete record of care.

Clinical exigencies can prevent complete documentation of care given. Institutional practices regarding the storage and retrieval of medical records may result in lost or duplicate charts.

There are cultural factors that may influence the completeness of the medical record data. Duplicated medical records may occur when patients register for care under different names, not an uncommon occurrence in the Mexican American population. This is partly because the cultural conventions of names and surnames are different in Mexican American and Anglo cultures.

For example, a Mexican American woman's complete name may be Maria de los Angeles Garcia Rodriguez de Gonzalez. The first surname is her father's, the second surname is her mother's, and the last surname is her husband's. Her friends and family probably call her Angeles, not Maria. An admissions clerk in a U.S. hospital faces the dilemma of how to fit this name onto a form that asks, "First, Middle, Last." One clerk may arbitrarily choose Maria Garcia. Or she may ask the woman what she prefers. Under either circumstance, in a subsequent episode of care the woman may not remember which name she was admitted under. She may use or be assigned another name. Or someone may try to locate a chart under the wrong version of the woman's name, conclude that the earlier chart is lost, and opens another, duplicate chart, which separates medical data pertaining to the same person.

In addition to cultural conventions, several undocumented Mexican American women have told this author that they prefer to use different names at different institutions, to confuse immigration authorities. Thus, there is an increased likelihood for duplicate chart numbers and missing charts in this population compared to the Anglo population.

The extent to which lost and duplicate patient charts are a problem at Merle West Medical Center is unknown. During data collection, eight records for the intervention group and ten records for the comparison group could not be located. In other cases, duplicate charts and separated medical data were found and remedied by collating them together, though the exact number was not recorded.

The most likely effect of missing and separated medical record data on the current study is to undercount or underestimate the absolute amount of utilization of care.

While there is no formal evidence, it may be assumed that these factors operated similarly in the treatment and comparison groups.

The other general problem affecting the reliability of medical record data is the interpretation required to extract the relevant data. These data often require significant detective skills to locate the relevant information in the medical record, meticulous attention to detail to capture all relevant information, and considerable clinical expertise to interpret and abstract the data correctly. The main kinds of error are thus omission of relevant data, and misinterpretation in the abstraction and coding process.

Variables from the Medical Record

Three types of variables, corresponding to the three research questions, were collected.

To answer Research Question 1c about the timing of prenatal care, the date of each prenatal outpatient visit for prenatal care was obtained. The use of hospital-based medical records for data about prenatal care is problematic, but was the best choice under the circumstances in this study. The case for this assertion will now be explained.

Data about prenatal care appear in the chart because outpatient providers, which include physicians, midwives, and clinics, desire to promote communication and continuity of care with inpatient providers. There are various procedures providers use to effect this goal. Some offices send records after the first lab work is complete, and then again after the results of lab work done at 28 weeks of gestation are available. Other providers send a copy of the prenatal records to the hospital at 36 weeks of gestation. Still other providers give a copy of the clinic records to the pregnant woman late in her pregnancy and ask them to bring them to each prenatal visit to be updated, and to carry them to the hospital when they go into labor.

The possibility for breakdown or failure of these various mechanisms for transmitting information may result in less-than-accurate documentation of outpatient prenatal visits and lab work in the hospital chart. Relevant data may be missing. The distribution of prenatal care visits may be skewed toward the early part of pregnancy, with later visits not documented in the hospital chart. It is unclear if outpatient providers changed their procedures for communicating with the hospital during the study period, and any differential effects on the treatment and comparison groups are impossible to ascertain.

One obvious solution to this problem was to collect data about prenatal care at the office or clinic where the pregnant woman received her prenatal care. Yet it was not always easy to discover where the pregnant woman received prenatal care, especially if she started care with one provider and changed to another in the course of her pregnancy.

Prenatal care data is likely to be lost when a woman starts prenatal care with one provider, then transfers to another provider in the course of her pregnancy, before the point in time that the first provider would normally send prenatal care records to the hospital. Even if the second provider has access to prenatal care records from the first provider, he or she is prohibited by federal law from releasing information from the first provider directly to the hospital without the patient's permission. If the patient has relocated or her phone or post office box discontinued or changed, as is common for highly mobile seasonal agricultural workers, such permission may be difficult or impossible to obtain. In this case, data about early prenatal care visits may be lost.

There is no way to know to what extent this scenario occurred among the women in the intervention and comparison groups. While the research team was able to use information supplied by ROMPP staff to find most if not all of the providers who cared for ROMPP participants, there are not similar means to learn where the comparison women got their care. Thus, in order to maintain the comparability of the prenatal care data for the intervention and comparison groups, the hospital record was the best choice for examining the distribution of prenatal care visits, even if it was likely to result in underestimated absolute values for the variables.

The reliability of the distribution of prenatal visits is also affected by the problems noted above with determining gestational age. The overestimation of gestational age would result in an apparent shift of the distribution of visits to later in the pregnancy, whereas an underestimation of gestational age would shift the distribution of visits to earlier months of the pregnancy.

To answer the Research Question 2, concerning emergency room and inpatient admissions, the following data were abstracted from the medical record: the number of prenatal emergency room visits; the number of inpatient admissions; the diagnoses associated with each visit or admission; and the lengths of stay for each inpatient admission.

To answer Research Question 3, the gestational age at the first screening serum glucose test was obtained. The reliability issues for this data are similar to those discussed in the section about distribution of visits. Screening tests that were actually performed but did not appear in the hospital medical record were not captured by the data collection procedure, and utilization of this test was probably undercounted.

Summary of variables from the medical record. The accuracy of medical record data for the number of emergency room visits, inpatient admissions, and initiation and timing of prenatal visits may be compromised by missing forms and records, and errors in the abstraction and coding process. These errors are most likely to result in omitted or undercounted utilization of care, and would underestimate the absolute value of the variables based on this data. It is likely that measurement error was distributed equally between the treatment and comparison groups. While the interpretation of absolute values should be approached very cautiously, the relative comparison of values between the two groups is less problematic.

Data Collection Procedures

In this section, the procedures used to collect the birth certificate and medical record data in the larger study are described. Issues of reliability which arose as a result of data collection procedures are addressed.

Birth Certificate Data

The principal investigator of the larger study worked with the staff of the Oregon Health Division's Department of Vital Statistics to effect the matching of birth certificates for the ROMPP and comparison women. Data from 1993 and 1994 were on computers. Data for 1988 through 1992 and for 1995 have not yet been computerized by the State, so these were located by manual search, and then entered by state employees into the computer. All data were provided to the study on floppy disks. Birth certificates for all Mexican American ROMPP participants and comparison women were successfully located.

Kotelchuck (personal communication, October, 1995) discussed the preparation of birth certificate data for calculation of the APNCU index. He noted that standards vary among the States' vital statistics departments regarding missing values for the initiation and number of visits of prenatal care, and data may need to be recoded according to the assumptions of the APNCU index. The assumptions used by the State of Oregon Vital Statistics Department and the APNCU for distinguishing between no prenatal care and missing data were identical, so no recoding of the data for this variable was necessary.

Medical Record Data

Medical record data were collected for the larger study to answer research questions about the costs and benefits of ROMPP. It was hypothesized that ROMPP participants would incur larger expenses for regularly scheduled prenatal care because they would have more visits, but that these costs would be recouped during the labor, delivery, and postpartum period because ROMPP women would use fewer resources for inpatient and postpartum care. The current study used a very small subset of this large and complex data set to answer questions about the distribution of prenatal care visits, the timing of the screening serum glucose test, and the utilization of ER and inpatient resources.

Medical record data were abstracted from hospital charts by a number of people, including the principal investigator, a consulting faculty member, four paid research assistants, and many volunteer graduate nursing students, most of whom had clinical experience in midwifery or women's health care. All of the personnel who abstracted data received basic training in finding data in the medical records and using the data collection forms designed specifically for the ROMPP cost analysis (Appendix B). Volunteers were most often supervised by telephone by the principal investigator. Data collection from hospital records was started in the summer of 1994 and was completed in the fall of 1996.

Completed abstracts were delivered to the study office. Each abstract was assigned a unique case number and all pages of the abstract were labeled with that number. The abstracts were then logged in, noting the unique case number and the number of pages in each section of the abstract. Data about prenatal care were coded by trimester, so it was necessary to determine the start of each prenatal trimester prior to coding. Using the birth date and gestational age recorded on the labor and delivery abstract, a fetal growth and development calculator was used to determine the start of each trimester, which were written at the top of the coding form. The abstract and form were clipped together, and stored in a locked drawer until retrieved for coding.

The next step was to prepare the abstracted data for computer entry. The code book and computer entry form were developed during a pilot phase by this author and three volunteer undergraduate students, working with the first 25 abstracts that arrived in the study office. At the time, it was felt that these 25 abstracts would supply a large part of the universe of codes needed to process the data.

Certain numerical data on the abstracts were simply transcribed onto a line on the draft form, for example, the birthweight and gestational age. Other data were present on the abstract as checked boxes, such as use of epidural anesthetic. These were assigned codes of 0 for "Not checked" and 1 for "Checked," and lines were added to the computer entry form for these variables.

Nonnumeric, narrative data on the abstracts were assigned codes that were organized into five categories of "incidents" of care: visits, lab tests, treatments and procedures, medications, and diagnoses. For example, a diagnosis of urinary tract infection was coded 900. Each time this diagnosis was assigned, the code is recorded on the appropriate line on the computer entry form.

The initial code book had three transcribed numerical variables, 29 Yes/No codes, and about 150 codes for narrative data. After the pilot phase of coding ended, several research assistants and volunteer graduate and undergraduate nursing students became involved in coding the abstracts. As each of the abstracts was coded, new codes were continually added to the code book as needed. There were few additions to the transcribed and Yes/No codes. But the incident codes grew rapidly, and the final version of the code book has more than 400 of these codes. Eventually, an alphabetic version of the code book was developed to help the coders find the relevant codes. A copy of the final version of the diagnoses section of the code books and the computer entry forms relevant to this study appears in Appendix C.

Communication among many coders working with a rapidly changing code book was facilitated by keeping a notebook of additions, deletions, and descriptors in the study office. Both the categorical and alphabetic version of the code book was updated and distributed to the coders on a weekly basis.

Several attempts to establish intercoder reliability failed, usually due to the coder's failure to notice one or more items on the abstracts. Finally, it was decided that every abstract would be examined by two coders, who came to agreement about the codes. Disagreements or questions about coding were resolved by the senior research assistant or the consulting faculty member. After data were coded, they were entered into the computer via CRUNCH, and correct entry was verified.

The chief problems affecting the medical record data collection procedure concern reliability. No formal efforts were undertaken to establish intercoder reliability. Telephone supervision hampered informal efforts to assess and enforce intercoder reliability, because the supervisor could not compare the medical record and the abstract to detect omissions. These only came to light if the abstractor asked specific questions which revealed a probable omission. The long distances traveled by the volunteers to the hospital site necessitated long work sessions. Comments by all parties involved in abstracting data indicate that fatigue played a role in the accuracy and precision of the data collection effort. Also, the hospital altered their chart forms and formats over the years, and data were sometimes difficult to locate in the hospital chart. Thus, between fatigue, less-than-ideal supervision, and chart format changes, it is likely that relevant data have been missed. This error is likely to underestimate the use of resources. It is unknown to what extent the intervention and comparison groups are affected by this error, but there is no reason to believe that there are significant differences between the groups in regard to this issue.

Data Analysis

In this section, the analyses used to answer each research question are presented. All data were analyzed by computer via the CRUNCH statistical package.

Research Question 1a

Did women in the treatment group initiate prenatal care earlier in their pregnancies than the comparison group?

This question was answered by the Adequacy of Initiation of Prenatal Care dimension of the APNCU index (Kotelchuck, 1994a). Birth certificate data for the month in which prenatal care was initiated was used to classify the initiation of prenatal care into four categories: Adequate Plus, Adequate, Intermediate, and Inadequate. Differences in the rank scaling of the Initiation of Prenatal Care between the treatment and comparison groups were tested via the Mann-Whitney U and F statistics.

Research Question 1b

Did women in the treatment group have a more adequate number of prenatal care visits than the comparison group?

This question was answered by the Adequacy of Received Services dimension of the APNCU index (Kotelchuck, 1994a). Differences in the rank scaling of the Adequacy of Received Services between the treatment and comparison groups were tested via the Mann-Whitney U and F statistics.

Research Question 1c

Did the treatment group have prenatal visits distributed throughout the pregnancies in a more appropriate way than the comparison group?

The mean number of visits for each month was calculated for the treatment and comparison group, and tested via a two-tailed Student's *t*. Despite the directionality implied by the research question, there are significant concerns about the completeness of the data set used to answer this question. A cautious and conservative approach dictates the use of a two-tailed test.

Research Question 2a

Did women in the treatment group have fewer visits to the emergency room during pregnancy than the comparison group?

The number of prenatal emergency room visits was calculated from medical record data for the treatment and comparison group, and the means for each group were tested via a two-tailed Student's *t*.

Research Question 2b

Were there differences between the treatment and comparison groups in the diagnoses associated with these visits?

The frequency of the diagnoses associated with emergency room visits were calculated from medical record data for the treatment and comparison group.

Research Question 2c

Did women in the treatment group have fewer prenatal inpatient admissions than the comparison group?

The number of prenatal inpatient admissions was calculated from medical record data for the treatment and comparison groups, and the means were tested via a two-tailed Student's *t*.

Research Question 2d

When admitted, did women in the treatment group have shorter lengths of stay than the comparison group?

The mean length of stay was calculated for the treatment and comparison groups, and tested via a two-tailed Student's *t*.

Research Question 2e

Were there differences between the treatment and comparison groups in the diagnoses associated with these admissions?

The frequency of each diagnosis associated with inpatient admissions was calculated from medical record data for the treatment and comparison group.

Research Question 3

Was the treatment group more likely to have screening serum glucose tests before the end of 29 weeks of gestation?

The gestational age at which the first screening serum glucose test was obtained from the medical record. The gestational age at which the screening serum glucose test was conducted was calculated, and differences between the mean gestational ages at screening in the treatment and comparison groups were tested via Student's *t*. A second comparison was performed by creating a dummy variable in which a screening serum glucose test performed before the end of 29 weeks was coded "1" and tests occuring later than 29 weeks were coded "0". The treatment and comparison groups were then compared using Chi square.

Human Subjects Concerns

This study met the criteria for exemption from the Institutional Review Board process. It involved secondary analysis of data already collected under procedures which received IRB review and approval for the protection of human subjects in June 1990 (Burton, 1993). Permission to review medical records was obtained from Merle West Medical Center by the principal investigator from the larger study.

ROMPP participants agreed to participate in ROMPP under informed consent guidelines. A copy of the consent forms appears in Appendix D. The consent and other study forms were translated and back-translated by two bilingual and bicultural members of the ROMPP staff to assure reliability and cultural relevance. Every effort to protect the confidentiality of all data was made throughout collection and analysis. Research assistants received training in and signed confidentiality agreements.

Participants were assigned a study identification number at the time of data collection. Study participants' names were cut out, marked through, or otherwise made illegible wherever they appeared, and data was kept under double locks when not in use.

RESULTS

In this chapter, the results of the data analysis will be presented, and answers to the research questions will be given. Each Research Question will be taken up in turn.

Research Question 1a

Did women in the treatment group initiate prenatal care earlier in their pregnancies than the comparison group?

The treatment group did not initiate prenatal care earlier than the comparison group, as measured by the Adequacy of Prenatal Care Utilization (APNCU) index's Adequacy of Initiation of Prenatal Care dimension. The treatment group was more likely to have "adequate" or "adequate plus" initiation of prenatal care (care that began within the first four months of pregnancy) than the comparison group, and less likely to have "intermediate" or "inadequate" initiation of care (later or no care). But the results were not statistically significant. The mean rank on the Adequacy of Initiation of Prenatal Care was 2.711 ± 0.889 for the intervention group, compared to 2.511 ± 0.901 for the comparison group, $U = 3979.5$, $p < 0.1048$. A rank of 2 signifies that the Adequacy of Initiation of Prenatal Care was "Intermediate," and a rank of 3, "Adequate." An *F* test of the group means was statistically nonsignificant, $F(93,96) = 1.026$, $p < 0.8985$. Figure 2 compares the rankings of the comparison and intervention groups.

Research Question 1b

Did the women in treatment group have a more adequate number of prenatal care visits than the comparison group?

There was no difference between the intervention and comparison group in the adequacy of the number of prenatal care visits as measured by the APNCU index's Adequacy of Received Services dimension. The mean rank of the intervention group was 2.763 ± 0.875, and 2.734 ± 0.930 for the comparison group, $U = 4498.0$, $p < 0.8661$. A rank of 2 signifies that the number of prenatal care visits was "Intermediate," and a rank of 3, "Adequate." An F test of the mean ranks was also nonsignificant, $F(93,96) = 1.128$, $p < 0.5593$. Figure 3 compares the rankings for the intervention and comparison groups.

Research Question 1c

Did the treatment group have different patterns of utilization of prenatal care? Specifically, were prenatal visits distributed throughout the pregnancies in a more

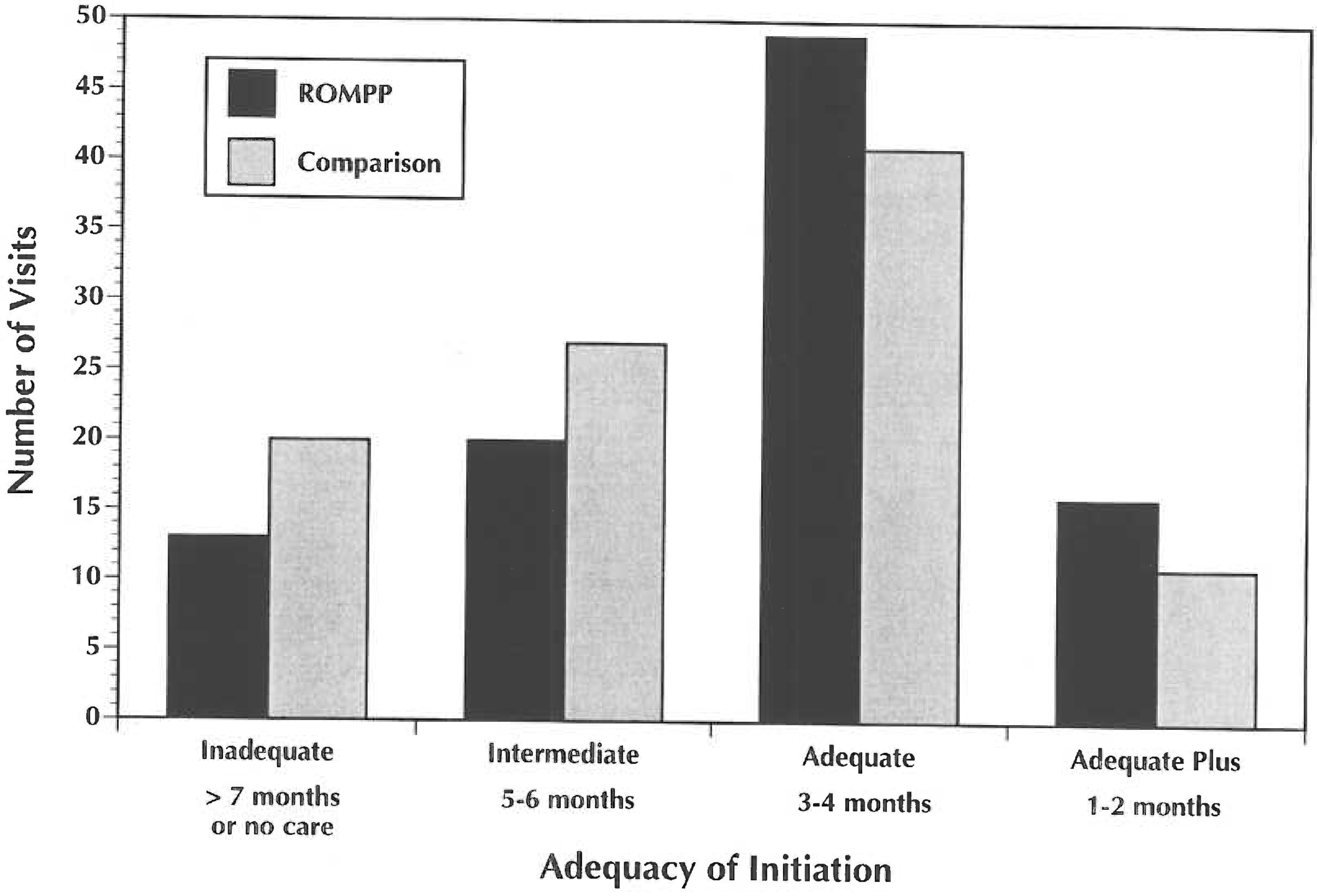

Figure 2. Adequacy of initiation of prenatal care in the intervention and compsrison groups.

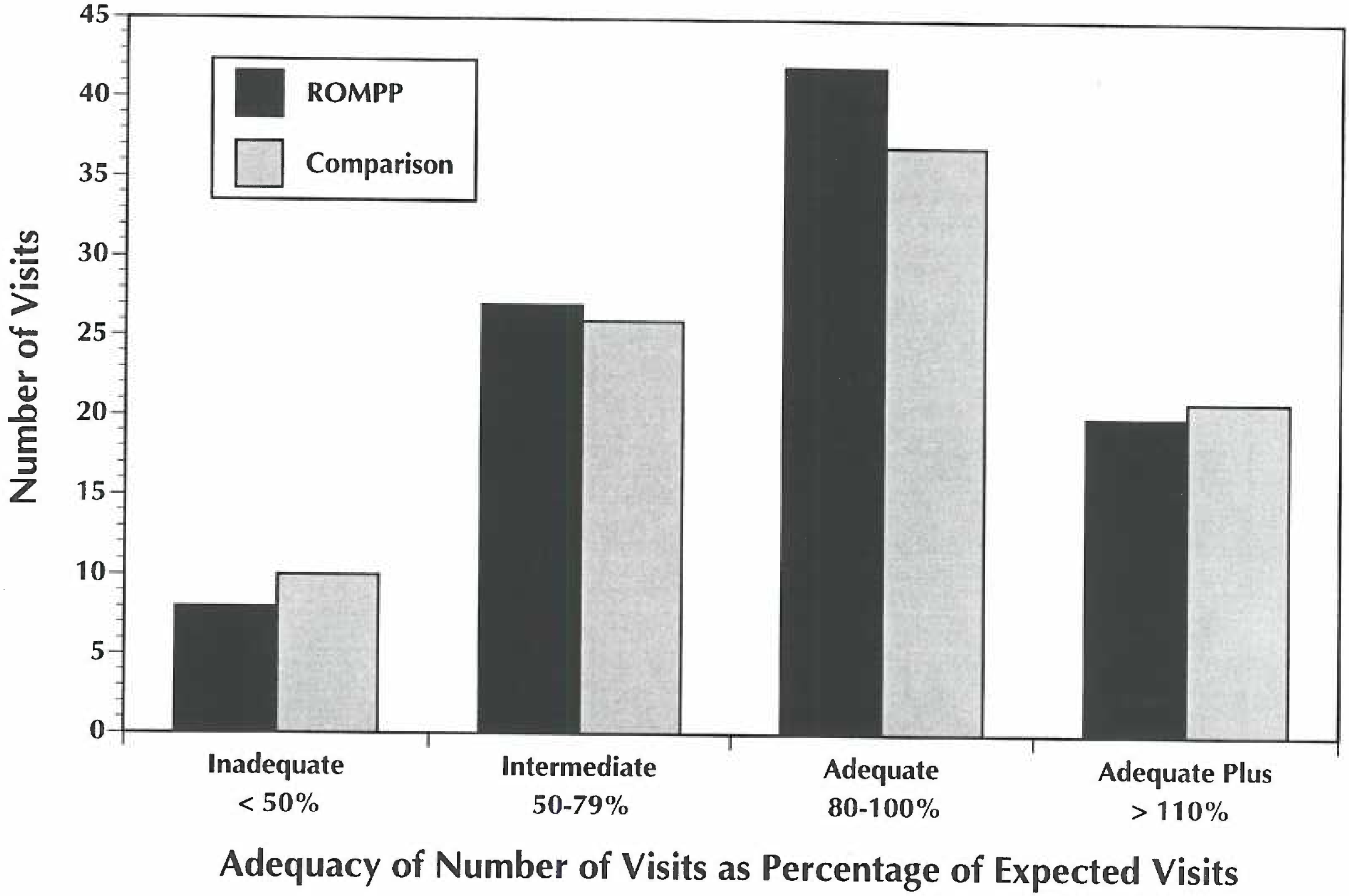

Figure 3. Adequacy of number of prenatal care visits in the intervention and comparison groups.

appropriate way in the treatment group than the comparison group?

It was hypothesized that ROMPP women were expected to have prenatal visits distributed more evenly throughout pregnancy than the comparison women. Results of the Student's *t* tests support this hypothesis. The intervention group had a statistically significant greater mean number of visits during months 2, 3, 4, 5, 6, and 7 than the comparison group. These results are presented in Table 5, and graphed in Figure 4.

Research Question 2a

Did women in the treatment group have fewer visits to the emergency room during pregnancy than the comparison group?

ROMPP participants were expected to have fewer emergency room visits than women not in ROMPP. The data did not support the hypothesis. There were 29 emergency room visits among 21 women in the intervention group, and 23 emergency room visits among 17 women in the comparison group. ROMPP women had a mean of 0.33 ± 0.66 emergency room visits, and the comparison women had a mean of 0.26 ± 0.62

Table 5

Mean Number of Visits in Each Month of Pregnancy

	ROMPP		Comparison		
Month	M	SD	M	SD	*p*
Month 1	0.04	0.29	0.03	0.18	0.78
Month 2	0.32	0.61	0.14	0.41	0.03
Month 3	0.50	0.67	0.30	0.57	0.03
Month 4	0.71	0.69	0.49	0.71	0.04
Month 5	0.89	0.79	0.60	0.70	0.01
Month 6	1.13	0.85	0.83	0.88	0.02
Month 7	1.51	1.07	1.14	0.97	0.02
Month 8	1.80	1.20	1.58	1.25	0.19
Month 9	0.50	0.76	0.42	0.79	0.50

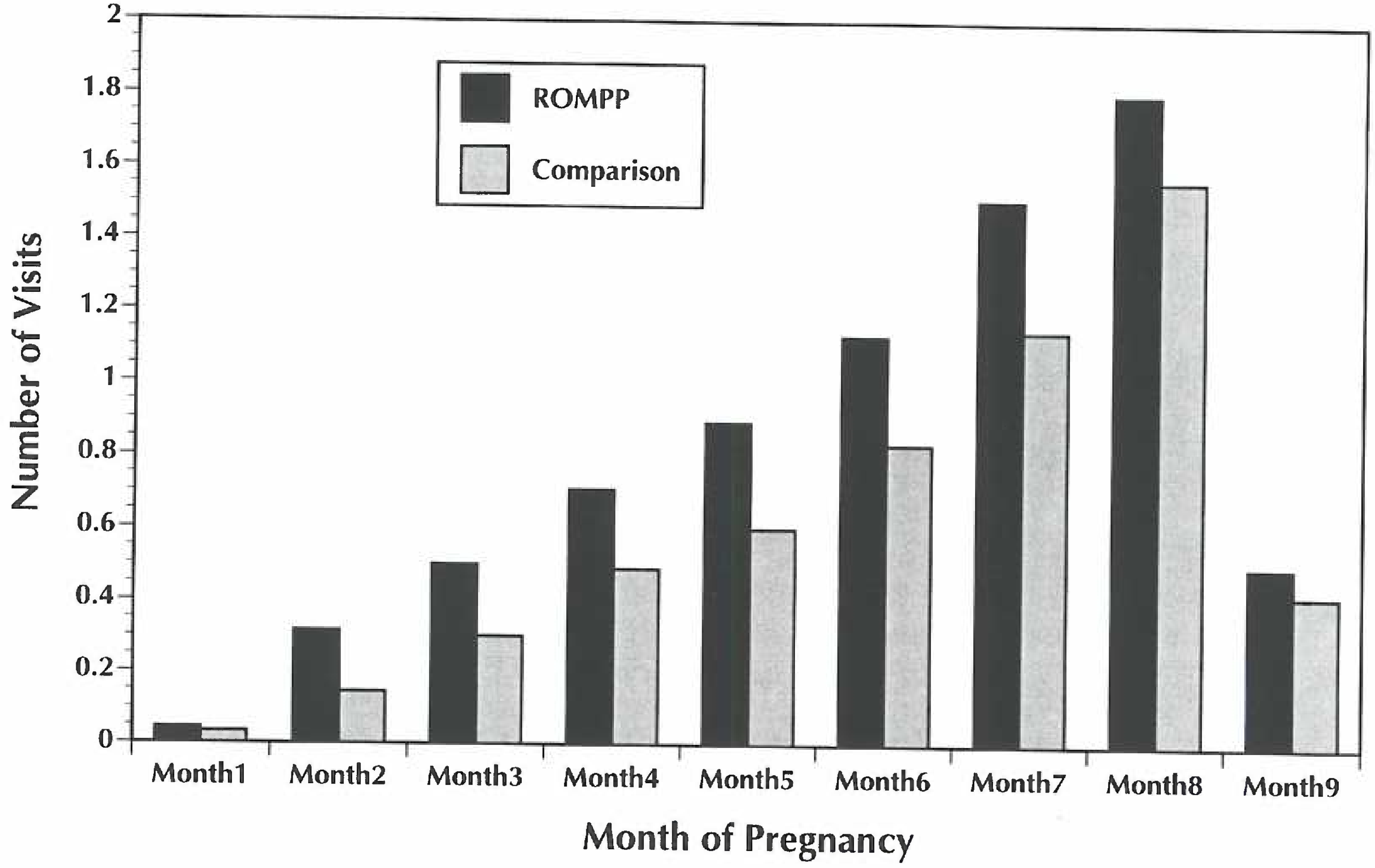

Figure 4. The distribution of prenatal care visits in the nine months of pregnancy.

emergency room visits. A Student's *t* test of the differences was not statistically significant, $t = 0.747$, $p < 0.4563$.

Research Question 2b

Were there differences between the treatment and comparison groups in the diagnoses associated with the ER visits?

Table 6 lists the emergency room diagnoses and the number of visits associated with each diagnosis in the intervention and comparison groups. It should be noted that there were more diagnoses than ER visits, as some visits were associated with more than one diagnosis.

Inspection of the diagnoses associated with ER visits shows that the intervention group had more diagnoses of respiratory-related illnesses than did the comparison group. And there were twice as many urinary tract infections diagnosed in the comparison group as in the treatment group, eight versus four.

Other than that, there is little apparent pattern. Numbers of visits for pregnancy-related conditions such as vaginal bleeding and preterm labor are similar, as are gastrointestinal diagnoses, and trauma-related diagnoses.

Table 6

Emergency Room Diagnoses

	ROMPP	Comparison
Threatened abortion	1	2
Vaginal bleeding of unknown origin	1	2
Vaginal bleeding/endocervical polyp	0	1
Preterm labor (rule out or actual)	2	2
Hyperemesis gravidarum	2	0
Vaginal infection	0	1
Anemia	0	2
Urinary tract infection	4	8
Renal calculus	1	0
Hematuria	1	0
Pneumonia	1	0
Pharyngitis	2	0
Bronchitis	1	1
Upper respiratory infection	2	1
Ear pain	1	1
Nausea and vomiting	0	2
Abdominal pain	3	2
Gastroenteritis	0	1
Reflux esophagitis	1	0

Interpersonal violence	1	0
Emotional distress	2	0
Syncope	0	1
Deep vein thrombosis	0	1
Table 6 (con't)		
Cellulitis	1	0
Burn	1	0
Motor vehicle accident	0	1
Crush injury to limb	1	0

Note: There were more diagnoses than ER visits because some visits were associated with more than one diagnosis.

Research Question 2c

Did women in the treatment group have fewer prenatal inpatient admissions than the comparison group?

The treatment group had more prenatal inpatient admissions than the comparison group, but the numbers are too small for statistical inference. There were 11 hospitalizations among seven women in the intervention group. In the comparison group, there were six inpatient admissions among four women.

Research Question 2d

When admitted, did women in the treatment group have shorter lengths of stay than the comparison group?

The treatment group had longer lengths of stay that the comparison group, but the numbers are too small for statistical inference. In the intervention group, the mean length of stay was 2.0 ± 0.63 days. In the comparison group, the mean length of stay was 1.5 ± 0.55 days. The small number of hospitalizations and associated lengths of stay means that a Student's *t* test cannot be meaningfully calculated.

Research Question 2e

Were there differences between the treatment and comparison groups in the diagnoses associated with these admissions?

Table 7 presents the diagnoses associated with each inpatient admission. There were more diagnoses than admissions because several admissions were for more than one diagnosis.

There is little apparent pattern to the admission diagnoses in the two groups. There were more admissions for preterm labor in the treatment group, where one woman with a multiple gestation pregnancy accounted for four of the five admissions for this diagnosis. In the comparison group, one woman had three admissions for deep vein thrombosis.

Research Question 3

Did the treatment group have better patterns of utilization of prenatal screening tests? Specifically, were they more likely to have screening serum glucose tests before 29 weeks of gestation?

Sixty-eight percent of ROMPP women who had a screening serum glucose test had it before the end of 29 weeks of gestation, compared to 58.5% of the women in the comparison

Table 7

Inpatient diagnoses

	ROMPP	Comparison
Vaginal bleeding of unknown origin	2	0
Vaginal bleeding due to low lying placenta	2	0
Preterm labor	5	1
Hypertension	1	0
Pregnancy-induced hypertension	2	0
Failed induction	2	1
Gestational diabetes	1	0
Hematuria	1	0
Abdominal pain	0	1
Deep vein thrombosis	0	3

Note: There were more diagnoses than admissions because several admissions were for more than one diagnosis.

group. Chi square analysis shows that the difference was not statistically significant $\chi 2(1, \underline{N} = 107) = 1.028, p < 0.31$.

The mean value for weeks of gestation of the screening serum glucose test was the same for both intervention and comparison groups: 28.8 ± 3.0 weeks for the treatment group, and 29.2 ± 3.9 for the comparison group. An F test was not significant, $F(52,55) = 1.618, p < 0.0802$.

Summary of Results

There were significant differences between the intervention and comparison group in the distribution of prenatal care visits in months 2, 3, 4, 5, 6, and 7. The women in the intervention group had prenatal care visits more evenly distributed through their pregnancies than the women in the comparison group.

The intervention group had a similar mean number of emergency room visits as the comparison group. The intervention group had more respiratory-related diagnoses, and the comparison group had more diagnoses of urinary tract infections.

ROMPP women had more inpatient admissions and longer lengths of stay than the comparison women, but the small number of these hospitalizations precluded statistical inference. In both groups, a few women accounted for a majority of the admissions.

No statistically significant differences were found in the adequacy of initiation of prenatal care or the number of prenatal care visits. No significant differences were found in the timing of screening serum glucose tests.

DISCUSSION

In this chapter, the results of each Research Question are discussed, and examined in relationship to the relevant literature.

The Adequacy of Initiation of Prenatal Care

There was no difference between the intervention and comparison groups in the initiation of prenatal care. On the Adequacy of Prenatal Care Utilization (APNCU) measure, ROMPP participants were more likely to initiate prenatal care at adequate and adequate plus levels, and less likely to initiate care at intermediate and inadequate levels than the comparison group, but the difference was not statistically significant.

The intervention and comparison groups were also similar on other measures of prenatal care initiation. For instance, there was no difference between the groups in the mean month of initiation of prenatal care. The mean month of initiation for the intervention group was 4.041 ± 1.72, and 4.45 ± 1.78 for the comparison group, $t = -1.604$, $p < 0.1105$; $F(93,96) = 1.066$, $p < 0.7543$.

The State of Oregon's benchmark for adequate prenatal care is initiation of care in the first trimester of pregnancy. There was no difference between the intervention and comparison groups on this measure. The percentage of ROMPP participants starting prenatal care in the first trimester was 41.2%, compared with 35.1% in the comparison group. This result is not statistically significant, $\chi2(1, \underline{N} = 200) = 0.760$, $p = 0.3834$.

The percentage of ROMPP women starting prenatal care in the first trimester in this study was comparable to that reported in the literature among predominantly Mexican-born and Spanish-speaking samples who participated in programs designed to improve access to prenatal care: 33.5% of women enrolling in the Comprehensive Pregnancy Program in rural San Diego County in 1985 (Bahry, Fullerton & Lops, 1989); and 41% of a largely Hispanic group of migrant women in North Carolina in 1985 (Watkins, Larson, Harlan & Young, 1990).

A closer look at ROMPP's recruitment and enrollment process is warranted. The intent of the intervention was to recruit prior to 20 weeks of gestation, but when the outreach team found women who were further along in their pregnancies with great need of ROMPP services, they felt a professional obligation to enroll them. In addition, it was not unusual for ROMPP participants not to be sure of how far along they were in their pregnancies. The estimated date of delivery would sometimes change once a ROMPP woman started prenatal care and got a more accurate estimate of gestational age. Almost 25% of ROMPP participants were recruited after 20 weeks of gestation. This fact points out the ethical tension affecting nurses conducting research in a clinical setting between duty to provide the best nursing care possible to individual clients versus obligations to a research protocol with the potential to advance knowledge for nursing practice.

The mean week of gestation at recruitment into ROMPP was 14 weeks. This is comparable to the values reported in the literature: 14.6 ± 6.8 weeks, among recent Mexican immigrants in a prenatal care clinic in Los Angeles (Zambrana, Dunkel-Schetter & Scrimshaw, 1991), who were not receiving any services which specifically promoted early prenatal care.

Forty-two percent of ROMPP women had not started prenatal care at the time they were recruited into the program. This high number suggests that ROMPP staff were successful in case-finding. There is little literature evaluating the effectiveness of outreach as an isolated intervention. York, Grant, Gibeau, Beecham and Kessler (1996) state that case finding may improve participation in care, but the number of clients recruited is often low and the cost per client enrolled is high. Another article reported outreach and case-finding to be an expensive activity. In a program serving an urban, African American population, extensive outreach activities resulted in only 5% of eventual program participants being recruited from the community (McCormick, Brooks-Gunn, Shorter, Holmes, Wallace, & Heagarty, 1989). It is clear that outreach efforts in ROMPP were more successful than reported in this literature.

If a ROMPP participant had not started prenatal care, the OW assisted her to find a provider and make an appointment. There was often a week or two delay between recruitment into ROMPP and the date of the first prenatal care appointment: thus, a mean of four months gestation at initiation of prenatal care. It is important to remember that there was adequate capacity to serve these women in the pool of local prenatal care providers.

The Adequacy of Initiation of Prenatal Care dimension of the APNCU index presents a methodological concern. The

APNCU compresses data about initiation of prenatal care in one of nine months of pregnancy into a scale of four categories. A loss of detail in the APNCU's categorical data makes it difficult to compare with other indices of initiation. For example, the APNCU designates prenatal care started in the fourth month as adequate, while the State of Oregon benchmarks specify adequate prenatal care as that which starts before the end of the third month.

The Adequacy of the Number of Prenatal Care Visits

No statistically significant difference in the adequacy of the number of prenatal visits was found between the treatment and comparison groups as measured by the APNCU index. The mean rank scores on the Adequacy of Received Services dimension of the APNCU index for both the intervention and comparison groups was "intermediate." Kotelchuck has not made it clear whether "intermediate" care should be conceptualized as adequate or inadequate. The following discussion assumes that intermediate care in thsi study was inadequate.

Looking at other indicators, the actual number of prenatal care visits, not adjusted for gestational age at delivery or at initiation of prenatal care, significantly different between the two groups. The mean number of prenatal care visits in the intervention group was 8.83 ± 3.3, and in the comparison group was 8.64 ± 4.5, $t = 0.327$, $p < 0.74$. There was also no relationship between the amount of face-to-face or phone contact by ROMPP staff and the number of prenatal care visits, neither for the CHN, $r = -0.0930$, $p < 0.42$, nor for the OW, $r = 0.1259$, $p < 0.28$.

The literature has described mixed results about the effects of interventions to increase the number of prenatal care visits. Some intervention studies found an increased number of prenatal care visits in the intervention group, though these studies did not use measures that were adjusted for gestational age at delivery (Kay, Shore, Jones, Smith, Garcia, & Yeo, 1991; Leppert & Namerow, 1985; McLaughlin, Altemeier, Christensen, Sherrod, Dietrich, & Stern, 1992; Villar, Farnot, Barros, Victoria, Langer, & Belizan, 1992; Watkins, Larson, Harlan & Young, 1990). Other intervention studies found no difference in the number of prenatal visits (Oakley, Rajan, & Grant, 1990; Olds, Henderson, Tatelbaum, & Chamberlin, 1986). In the study most similar to ROMPP, a model program for migrant farmworkers, the number of prenatal care visits increased from 7.4 to 9.7 (Watkins, Larson, Harlan & Young, 1990).

The ROMPP intervention was not effective in improving the adequacy of the number of prenatal care visits despite the constant efforts of the ROMPP staff to encourage prenatal care utilization by assisting with scheduling appointments, providing transportation and translation services, and helping negotiate financial arrangements with health care providers. ROMPP staff and community health nurses were asked about this result (K. DeVoss, K. Easton, personal communication, November, 1996). They expressed surprise and some disappointment that their efforts weren't apparent in the data, but after some thought, attributed continued barriers to care as the cause of the lack of differnce between the treatment and comparison groups. They identified five persistent barriers to prenatal care that the intervention was unable to surmount: attitudinal barriers among ROMPP participants, attitudinal barriers among prenatal care providers, financial concerns, problems with transportation, and language differences.

The literature supports a focus on persistent barriers. For instance, Castro, Furth, and Karlow (1984) found that unacculturated Mexican American women subscribe to a mixture of mainstream biomedical and traditional folk beliefs based on past health-illness experience. They suggest: "In cases of noncompliance with a prescribed medical or behavioral treatment, the health professional should look toward clarifying the health instructions presented to the patient or to environmental barriers as factors that are interfering with the Mexican-origin patient's ability to comply" (p. 380). This suggests looking at both patients and providers for explanation of findings.

Two other sources of data were used to explore the effects of ROMPP, and test and extend the staff's perceptions. A Client Satisfaction Survey (CSS) was administered to each ROMPP participant at an exit interview during the postpartum period. The survey included space for open-ended comments about ROMPP, existing prenatal care services in the community, and participants' ideas for improvements in the ROMPP program.

The other source of data used here was two focus groups conducted among ROMPP participants at the end of the study to explore beliefs and attitudes about pregnancy and prenatal care and perceptions of ROMPP. The following discussion will use the comments generated by ROMPP staff, the CSS, and focus group participants to explore five persistent barriers: attitudinal barriers among ROMPP participants, attitudinal barriers among prenatal care providers, financial concerns, problems with transportation, and language differences.

Attitudinal Barriers Among ROMPP Participants

The staff reported that the primary attitudinal barrier was a cultural-based tendency not to seek preventive services. Mexican Americans tend to regard pregnancy as a normal, natural process which requires little intervention unless there are problematic symptoms (Alcalay, Ghee, & Scrimshaw, 1993; Jasis, 1987). Mexican American women may not be aware of, or may discount the value of prenatal care for the prevention and/or early detection of complications (Moore & Hepworth, 1994).

In an extreme example, one ROMPP participant, an adolescent and recent immigrant, received no prenatal care throughout her pregnancy despite three home visits by the ROMPP nurse and 16 face-to-face or phone contacts by the OW. She lived 45 minutes away from her prenatal care provider, and though appointments were made, she was never able to keep them. ROMPP was able to enroll her in WIC. She delivered a healthy infant at term.

In the CSS, several ROMPP women repeatedly commented about how much they appreciated the "orientation" to community resources such as prenatal care, WIC, and Adult and Family Services. The literature also mentions the importance of help in making initial arrangements for prenatal care (Gaviria, Stern, & Schensul, 1982). ROMPP participants may have valued the risk assessment and referral aspects of the intervention more than the promotion of prenatal care in particular. One participant wrote, "I wish there were more nurses coming out to provide other types of health screening to everyone, because what we earn is usually not enough and very limited."

Feeling well and avoiding embarrassment associated with doctors were cited by women in Tijuana as reasons for avoiding prenatal care (Alcalay, Ghee, & Scrimshaw, 1993). In the ROMPP focus groups, the women talked about how embarrassing it was to visit the doctor, not just the physical exam, but also the intimacy of the questions that they asked. Some focus group participants thought that they would have been less embarrassed with a female provider, but others said they would have been equally embarrassed.

Several comments in the CSS imply that some ROMPP participants may have viewed ROMPP as a substitute for prenatal care, e.g., "I liked that fact that they would come to my house and provided information as well as do a prenatal checkup" and ". . . the visits help because you are examined to see that the pregnancy is going well and learn new things and get information."

Attitudinal Barriers Among Prenatal Care Providers

Attitudinal barriers may have existed on the provider's side as well. When asked about the study's findings, one community professional suggested that local health care providers were not accustomed to the demands of this patient population and faced little prospect of financial reward. Under these circumstances, the providers may have offered the minimum level of service necessary to assure an "adequate" level of care by the provider's standards. The provider's standards may not conform with ACOG guidelines (American College of Obstetricians and Gynecologists, 1992), on which the APNCU is based. While this explanation is rather speculative, it is not implausible.

ROMPP had little direct control of certain aspects of culturally appropriate care, such as provider attitudes toward the pregnant woman's cultural heritage, the provision of culturally appropriate educational materials, and the negotiation of culturally sensitive options for the plan of care. The extent to which these aspects were addressed in the relationship between pregnant woman, outreach worker, the community health nurse, and health care provider in the ROMPP intervention is unknown. It would be very interesting to have had more information about these issues.

Financial Concerns

Financial concerns appeared to remain a barrier to prenatal care. Financial worries have also been cited in the literature (e.g., Bahry, Fullerton and Lops, 1989; Gaviria, Stern, & Fullerton, 1982). Analysis of the data collected by ROMPP staff when enrolling women into the program shows a positive correlation between income and the number of prenatal visits ($r = 0.19$, $p < 0.05$). ROMPP staff referred all who were eligible to third party sources of payment, but the 54% of the ROMPP participants who were undocumented immigrants had to rely on their own resources to pay for prenatal care. To help these women, Merle West Medical

Center had an arrangement with local providers to negotiate and receive monthly payments for the provider's prenatal care and delivery service package. The ROMPP outreach worker (OW) helped with these negotiations. But the ideas of packaged services, consumer credit, and monthly payments are not common in Mexico among rural residents and agricultural laborers, and the ROMPP women may not have understood that the charge for the pregnancy care package was the same if they had three prenatal care visits or ten. The focus group participants briefly discussed financial concerns. Several comments on the CSS pointed to financial problems: "I wish there was a clinic that wasn't so expensive" and "a sliding scale fee for those who could not afford to pay high medical bills."

Transportation Barriers

All sources mentioned transportation as a persistent problem, despite ROMPP's efforts to provide rides as much as possible within the constraints of staffing. Data collected by ROMPP staff when enrolling women into the program show that women who lived more miles away from their prenatal care provider started prenatal care later than ROMPP women who lived closer to their providers ($r = -0.28$, $p < 0.01$).

ROMPP women who perceived transportation as a greater problem started prenatal care later ($r = 0.29$, $p < 0.009$) and had fewer prenatal care visits ($r = -0.30$, $p < 0.007$) than did other ROMPP women.

Staff reported that coordinating appointments and transportation with the 38% of ROMPP participants who didn't have telephones in their homes was difficult. Clients would assume they had a ride and wouldn't need the OW's help, only to find the day of the appointment that the car didn't run or that their husbands needed the car to get to a work site. Most focus group participants shared times when they missed prenatal care appointments due to problems with transportation.

Language Barriers

Language barriers persisted as well. ROMPP staff reported continued problems with language barriers, particularly when ROMPP clients didn't have the OW's help. Focus group participants commented that the number of clinics with bilingual providers and/or auxiliary personnel has increased over the past few years, but it is unclear if these changes happened soon enough to influence the intervention. The medical charts showed that the hospital frequently used the AT&T translation services, but it is unknown to what extent the providers and participants used these services outside the hospital setting.

Appreciation for assistance with translation was often mentioned in the CSS. In addition to translating at prenatal appointments, ROMPP staff helped translate utility bills, notes from school, and other day-to-day communications. Yet language and perhaps cultural barriers clearly remained for at least some participants, who made comments like, ″A clinic is needed that speaks Spanish″ or "a clinic that is geared to Hispanics″ or "it would be nice to have a Spanish-speaking doctor.″ Women in Chicago mentioned preference for Spanish-speaking providers in the literature in 1977 (Gaviria, Stern, & Schensul, 1982).

Summary of Barriers

One focus group participant's comments summed up the barriers: "In the first place, I don't like doctors. And also the money. Because I have to pay it all, or perhaps in payments, but at times there is no work. My husband may not work. At times then perhaps we couldn't pay. If I had an appointment today I said to [my husband], oh I'll cancel and make another for the coming week. . . . I wouldn't like the doctor. But they were always reminding me, you have to go to the doctor and you must go to the doctor. And the program was always there. Even when one didn't want [to go], the program always encouraged one to go to the doctor and it made one feel like she must go to the doctor, that it's very important for one to see [the doctor]. And it's a very good program."

The Distribution of Prenatal Care Visits

The women in the intervention group had prenatal care visits more evenly distributed in the first and second trimesters of their pregnancies than the women in the comparison group, with statistically significant differences in the mean number of prenatal care visits in months 2, 3, 4, 5, 6, and 7.

An increased number of visits during the first and second trimesters provide an increased opportunity for education, assessment, and treatment of complications of pregnancy. This is particularly true of conditions that require nutritional interventions such as anemia and gestational diabetes, complex behavioral changes such as smoking cessation, or difficult social issues such as intervention to prevent domestic violence.

One aspect of the results regarding the distribution of visits that deserves comment is the decrease in the mean number of visits found in the ninth month of pregnancy. ACOG guidelines call for one prenatal visit per week in the last month of pregnancy, for an average of four visits. Kogan, Kotelchuck, and Johnson (1993) found between 3.0 and 6.3 mean visits per month during the eighth and ninth months of pregnancy.

In the ROMPP study, the number of prenatal care visits in each group decreased to less than one visit in the ninth month. Premature delivery is not a likely explanation, since the mean gestational age at delivery was 39.6 ± 2.03 in the intervention group and 39.6 ± 2.5 in the comparison group, $t = 0.049$, $p < 0.96$.

It is more likely that data for the last months of pregnancy were missing from the prenatal care flow sheet in the hospital record. It must be remembered that this data source was used because it was convenient and likely to yield equally complete (or incomplete) data for the intervention and comparison groups. Future studies concerned with distribution of care should extract these data directly from the prenatal care providers' records.

The pattern of the distribution of visits was similar between the intervention and comparison groups: a steady increase until the last two months. Neither group had a pattern of visits which adhere to clinical standards, though the ROMPP group approached the clinical standard of one visit per month during months 5 and 6. These facts diminish somewhat the clinical significance of these statistically significant findings. There was no evidence in either group for a decrease in visits in the middle months of pregnancy, as has been reported in other populations (Alcalay, Ghee & Scrimshaw, 1993), and observed by this author in her clinical practice.

Emergency Room Utilization and Associated Diagnoses

There were no significant differences between the two groups in emergency room (ER) use. The small number of visits precludes statistical inference. ROMPP participants were expected to have fewer ER visits than women not in ROMPP, since the ROMPP women should have had better access to a regular health care provider in a nonemergent outpatient setting for these type of services.

The intervention group had a similar mean number of emergency room visits as the comparison group. The comparison group had more diagnoses of urinary tract infections, and the treatment group had more respiratory-related diagnoses than the comparison group. Perhaps a particularly nasty flu bug affected the community during the intervention period. Or perhaps these results may represent the vagaries of a relatively small sample, and may have disappeared in a larger sample drawn over a longer period of time.

Five of the seven respiratory diagnoses were of conditions that were most likely nonemergent, such as upper respiratory infection, pharyngitis, and ear pain, which could have been diagnosed and treated in a less costly outpatient setting. One local prenatal care provider suggested that emergency room use would be difficult to influence in this population because many women must wait for their husbands or family members to return from work to get a ride into town, and are therefore unable to seek care during office hours. Finances are too tight to take time off work even when family members are ill. A future study could test this hypothesis by looking at the time of day ER visits take place.

In the ROMPP group, ER use peaked in the second trimester, whereas in the comparison group ER use peaked in the third trimester (Figure 5). The decrease in ER utilization among the ROMPP women in the third trimester may have occurred by chance, or may be a result of the intervention; the number of visits is too small to evaluate statistically. Still, the result is intriguing, and deserves attention in future research.

Inpatient Care Utilization and Associated Diagnoses

ROMPP women had more antepartum inpatient admissions and longer lengths of stay than the comparison women. The small number of hospitalizations in each group precludes statistical inference. It is impossible to know if the difference in inpatient admissions between the two groups is a circumstance of the small sample size, or is due to the intervention.

There were two hypotheses posed about utilization of inpatient care. On the one hand, it was proposed that ROMPP participants would have fewer hospital admissions due to regular and timely prenatal care and the nursing support available through ROMPP. On the other hand, ROMPP participants might have more hospital admissions, since they

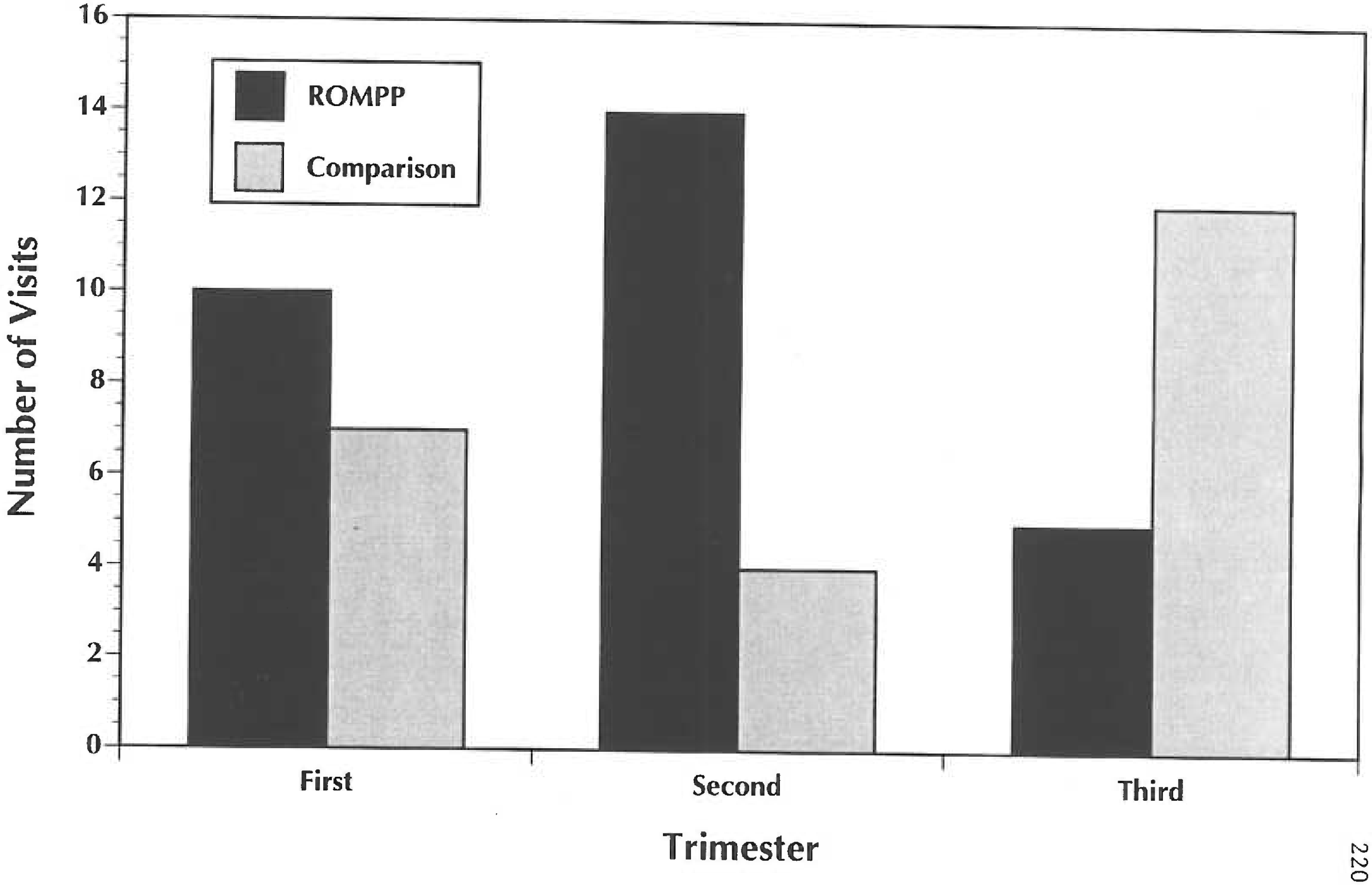

Figure 5. Number of emergency room visits by trimester.

had more contact with the health care system and more opportunities to be diagnosed with conditions that require inpatient management.

There is some evidence to support the second hypothesis. Four of the five admissions for preterm labor in the intervention group were for a woman who was pregnant with twins. She was recruited into ROMPP at 17 weeks of gestation, and her problems with premature labor started about one month later. With extensive ROMPP surveillance and support, she was able to carry the twins to 37 weeks of gestation. This case, early in the ROMPP project, won the confidence and support of the community's health care providers. Without ROMPP's assistance, this mother might have delivered much more prematurely, and had a more lengthy and costly inpatient stay for her premature infants. The current study was not designed to capture postnatal outcomes.

The longer length of stay in the intervention group is probably related to the relative seriousness of the prevalent admitting diagnoses in the ROMPP group: preterm labor associated with multiple gestation, and vaginal bleeding due to low-lying placenta. These biomedical problems are not amenable to any positive influence of the intervention.

The Timing of the Screening Glucose Tolerance Test

No statistically significant differences between the comparison and intervention group were found in the timing of screening serum glucose tests. It was expected that more ROMPP women than comparison women would have an appropriately timed screening serum glucose test, before the 29th week of gestation. The findings do not support this hypothesis. There were no statistically significant differences between the two groups in the mean week of testing nor in the percentage of women who had the test before the end of the 29th week of gestation. Apparently, whatever advantage was conferred to ROMPP participants in having a greater number of visits in the sixth month of pregnancy did not translate into more timely provision of the screening glucose tolerance test, which occurs during the sixth month.

In practice, the screening glucose tolerance test may be performed in the provider's office, or the pregnant woman may be referred to a free-standing clinical laboratory for this test. The test may be done at the same time as a routinely scheduled prenatal care visit, or may be done in a separate visit. The cost of the test may be included in the prenatal care package, or there may be an extra charge for this test. These factors were not examined in this study. Screening tests that are performed as part of a routine prenatal care visit in the provider's office and charged as part of the prenatal care package would present fewer barriers than tests that required an additional visit to an unfamiliar free-standing lab for an additional charge.

There was no evidence for a screening glucose test in the medical records of 39% of the intervention group, and in 41% of the comparison group. It seems unlikely that this many women did not get a screening glucose test, and it is likely that incomplete documentation of this aspect of prenatal care in the hospital medical record compromised the data. Future studies concerned with provision of particular aspects of prenatal care should extract these data directly from the prenatal care providers' records.

Summary of the Discussion

Several rival hypotheses could explain the overall lack of statistically significant effects of the ROMPP intervention on prenatal care utilization. It is possible that the intervention was ineffective. It is also possible that it wasn't of sufficient intensity or "dose" to affect the adequacy of the number of prenatal care visits. Or perhaps there were unknown and uncontrolled factors operating in the community that obviated the effect of the intervention. Lastly, the relatively small sample size lacked statistical power, and may have prevented finding a difference between the two groups where one actually existed.

Two of these rival hypotheses seem most likely. The first is the small sample size. Suggestions for how a study trial could be redesigned to reduce or obviate this effect are presented in the next chapter.

The other likely explanation for the lack of positive findings is the persistence of barriers to prenatal care that the intervention was unable to surmount, including attitudinal barriers, financial concerns, problems with transportation, and language differences. The persistence of these barriers implicates both the design and the execution of the intervention. Suggestions for how the intervention could be redesigned to increase its effectiveness are provided in the next chapter.

IMPLICATIONS FOR NURSING PRACTICE, POLICY, AND RESEARCH

In this chapter, the implications of the study for nursing practice, policy, and research are discussed. The first section presents the study's implications for nursing practice and health policy. Suggestions for how the intervention could be redesigned for increased effectiveness are included in this section. The second section in this chapter discusses the limitations of the study and implications for further research. Suggestions for redesigning the intervention trial to increase the sample size are presented in this section. The last section presents a summary of the entire study.

Significance for Nursing Practice and Policy

The results of this study have implications for public health nursing program development and health care resource allocation. In this section, programmatic recommendations will be made first. Then a discussion of several strategies for health care resource allocation will be presented.

The study's results show that prenatal care utilization in the intervention and comparison groups was of intermediate adequacy in both initiation of care and in the number of prenatal care visits. The discussion in this section assumes that these results are due to barriers to prenatal care that persisted despite the ROMPP intervention. Implications of these findings for public health nurses involved in promotion of prenatal care will be presented.

Wise (1994) suggests that programs which seek to promote early initiation of prenatal care should improve community health education and outreach activities. Study results found that 42% of the ROMPP sample was not enrolled in prenatal care at the time of recruitment. Even so, ROMPP participants did not initiate prenatal care any earlier than the comparison women. Literature that has reported outreach as expensive or ineffective (e.g. McCormick, Brooks-Gunn,Shorter, Holmes, Wallace & Heagerty, 1989) may apply to this sample.

Data from the Client Satisfaction Survey demonstrate that outreach activities which provide a community orientation for newcomers and referral to needed services are valued and should be continued and perhaps expanded. Nurses could disseminate information about community resources and the importance of early prenatal care via a marketing program directed at Spanish-language radio and cable TV. Data collected at enrollment indicated that these media were available in most ROMPP households. Marketing could also involve businesses that cater to the Mexican American population, such as groceries, bakeries, and restaurants. Alcalay, Ghee and Scrimshaw (1993) described such a project, in which public service announcements, wall calendars, and *fotonovelas* (comic-type books for teens and adults in which the action is photographed rather than drawn) were developed and disseminated to residents of poor barrios in Tijuana.

To promote an adequate number of prenatal care visits once such care is initiated, nurses should work to pinpoint and address persistent barriers to care (Wise, 1994). In ROMPP, these barriers included client and provider attitudes, financial concerns, problems with transportation, and language differences. The persistence of these barriers may be due to inadequacies in both the design and execution of the intervention trial. Problems in the execution of the intervention will be discussed first, then suggestions will be made for how the intervention might be altered to address specific barriers.

The major problem with the execution of the intervention at the Klamath County Health Department site was an inadequate number of staff to deliver the intervention as intended. The original ROMPP proposal specified six prenatal home visits by the public health nurse; this number was later changed to three to reflect what was feasible given the level of staffing. In the last few months of the intervention, the outreach worker (OW) was frequently reassigned to other jobs within the department, and several ROMPP clients received few or no OW visits. The OW was a key element in providing transportation, translation, and cultural brokerage for ROMPP clients. It is difficult to gauge the effect of decreasing her level of service in the last months of the trial. It is possible that persistent barriers to care could have been overcome if more staff had been available to the intervention, that is, if the intervention had been offered with the original "dose" or intensity (Olds, Henderson, Tatelbaum & Chamberlin, 1986; Poland, Giblin, Waller, Jr,, & Hinkin, 1992). Adequate staffing is required to get positive results, or at least to rule out inadequate implementation as a reason for insignificant results.

Suggested Expansion of the Intervention

Several strategies could be used to address clients' and providers' attitudinal barriers. The marketing program mentioned previously could contain messages about the importance of consistent prenatal care throughout pregnancy.

To diffuse any confusion between home visits and regular prenatal checkups, staff should consider the possible impact of providing direct services such as checking fetal heart tones. If provided, this care should be differentiated from routine prenatal visits and make it clear that the CHN's visit is not a substitute for regular prenatal care.

Public health nurses and prenatal care providers should consider and integrate the findings of the focus group data about being embarrassed when providers ask intimate questions, as well as by the physical exam. Female providers may have an advantage here, but not all focus group participants agreed that they were less embarrassed with a female provider. Mexican Americans typically use modest and elliptical language to discuss sensitive topics, particularly sexuality. Nurses and providers should, when possible, defer intimate questions until adequate rapport and mutual respect are established. The issue of modesty points to the importance of understanding the woman's culture as well as her language.

Language and cultural differences are formidable institutional barriers to prenatal care. Programs should be developed for public health nurses and local prenatal care providers to cultivate their appreciation for Mexican American culture and promote cultural competence and sensitivity. Ideally, bilingual and bicultural providers and staff should be recruited. Also, language training should be offered to existing staff. More immediately, interpreter skills should be promoted. Training courses could be offered: for interpreters about medical terminology and confidentiality, and for monolingual providers about cross-cultural and interpreter-mediated communication (Larson, McGuire, Watkins, & Mountain, 1992). Public health nurses could work with providers to ensure the provision of culturally appropriate educational materials, and negotiate culturally sensitive options for the plan of care. Given the level of diversity within the Mexican American community, providers should ascertain the specific beliefs and practices of each of their Mexican American clients, and individualize care accordingly.

Several comments on the Client Satisfaction Survey suggested that ROMPP offer driving lessons and help with studying the driver's pamphlet to obtain a driver's license. Also, the county health department could provide a van service to appointments. Public health nurses could work with other agencies, private businesses, community service organizations such as Rotary or Kiwanis, or church groups to provide these services. Nurses might also want to join with other interested parties to advocate for the development of a rural intercity transit system.

Cultural barriers could be lowered if the Mexican American community had more input about the nature and quality of the services that were offered. Nurses could work in a coalition with other interested parties to start a community center or *casa de cultura*, similar to the center described by Rodriguez, McFarlane, Mahon, and Fehir (1993). Such a center could promote family and parental competencies (Alexander & Korenbrot, 1995, p. 113), and provide an organizational context for a community advisory board. A board of directors of the center could encourage natural leaders within the community to work with local providers, public agencies, and private institutions to develop goals and programs that address the health care and other needs of the Mexican American community. Such a strategy is consonant with the calls for the empowerment of underserved Latino groups (Furino & Sumaya, 1992).

Programmatic strategies to address persistent financial barriers are few. In a circumstance such as that in Klamath Falls, nurses should emphasize to their clients the package nature of the services they pay for as negotiated by the hospital service. Nurses have traditionally avoided discussing money with their clients. But the needs of this population may require that nurses assess their clients' knowledge of, and provide education as necessary, about financial concepts such as managed care, budgeting for monthly payments, and the pleasures and pitfalls of consumer credit.

The use of incentives to encourage prenatal care has been suggested (Curry, 1987, p. 46). ROMPP provided T-shirts and a gift certificate to the local K-Mart as incentives to complete the intervention. Nurses may want to expand the use of incentives to include food, discount coupons, or reduced fees to initiate early prenatal care and attend a certain number of appointments (Curry, 1987).

Most of the effort to address financial barriers among this low income population requires examining the allocation of public monies. Medicaid reform has had a limited impact on the population from which ROMPP participants were recruited, because a majority of these women are undocumented immigrants and not eligible for Medicaid to pay for prenatal care.

Others have advocated redirecting the focus on Medicaid during the perinatal period to comprehensive health care throughout a woman's lifetime (e.g., Hughes & Runyan, 1995). Wise (1994) evokes "the continuity of risk and patterns of health care utilizations over the course of a woman's lifetime" (p. 1375) to advocate universal access to health care as a key strategy in preventing poor pregnancy outcomes. Prepregnancy health care could reduce risk due to smoking, substance abuse, poor nutrition, nonimmunity to rubella, and chronic or recurrent disease including sexually transmitted infections, hypertension, diabetes, and genetic diseases (Alexander & Korenbrot, 1995; Wise, 1994). Access to family planning and abortion have also been mentioned as part of a comprehensive program for women's health (e.g., Willis & Fullerton, 1991). Health care after delivery could include information about family nutrition, parenting, immunizations, and other preventive health practices. Referral to social services could address issues related to housing, domestic violence, and educational needs (Alexander & Korenbrot, 1995), and addressing problems related to poverty and low income.

Unfortunately, funding for comprehensive health care beyond pregnancy has been politically problematic. Hughes and Runyan (1995) summarize the reasons. First is the nation's longstanding ambivalence about public assistance. The second is the special status granted to pregnancy and the unborn fetus. The third is the limited amount of data about the health effects of inadequate access to care among nonpregnant women, compared to the more intense focus on outcomes related to late or no prenatal care. Furino and Sumaya (1992) note that politicians and the public are chronically impatient with long-term commitments and delayed rewards inherent in the investments required to improve health status.

Funding problems are further compounded for immigrant and undocumented women. Most societies limit documented and undocumented immigrants' entitlement to social benefits such as health care (Bollini & Siem, 1995). Title V and Community and Migrant Health Center funding, the programs which have funded much of the care for the Mexican American immigrant population in the past three decades, have been scheduled for cuts or elimination in recent sessions of Congress. There is significant opposition among policy-makers to helping even documented immigrants in the current budget and political environment.

But the real problem that even comprehensive health care would not address is related to poverty. The ROMPP population lacks ready access to safe and affordable housing, reliable transportation, telephones, and a steady, adequate income. It is hard to imagine a prenatal intervention that could adequately address the effects of a lifetime of poverty on reproductive outcomes.

Yet comprehensive policy initiatives can produce positive changes in prenatal care utilization and perinatal morbidity. This is perhaps best illustrated by the case of Turkish immigrants in Sweden. Bollini and Siem(1995) reported that in Sweden, the perinatal mortality rates for immigrants born in southern Europe, most notably Turkey, are actually lower than the rates for Swedish-born women. They note that the Swedish government has made great efforts to provide culturally appropriate services to immigrant women, including legally mandated translation services. In earlier work, Bollini(1993) argued that Sweden's success in meeting the needs of its immigrant population rest on three policies: (a) open immigration policies that encourage permanent settlement and naturalization; (b) a national health insurance program financed by general revenues; and (c) specific health policies targeted to immigrant groups. The Swedish data demonstrate that even with favorable immigration policies and universal access to health care, programs which specifically address cultural aspects of care are still necessary to promote healthy pregnancy outcomes.

Alexander and Korenbrot (1995) advocate a health care system which "promotes the health of infants and women, facilitates reproductive choice, and assures access and availability of comprehensive health care and ancillary services" (p. 115). They acknowledge that reeducating policy makers about the importance of universal access to care, to say nothing of measures to address persistent poverty or humane immigration reform, will be difficult. Yet nurses must be ceaseless in their efforts to do just that. Nurses as policy makers are thus challenged with the responsibility to develop interventions which ameliorate suffering and promote health within the constraints of the system in which their practice is embedded, all the while pushing the boundaries of that system to effect incremental change that benefits their clients and society as a whole.

Limitations of the Study

This study suffered from many of the same flaws apparent in many of the studies in the literature review. Most notably, the design of ROMPP did not allow random assignment to the treatment and comparison group, so there was the potential for nonequivalent comparison and intervention groups. Despite the matching procedure, there was no way to rule out the possibility that women in the comparison and treatment groups systematically differ on other, unmatched variables.

There were three main types of threats to the internal validity of the study: history, testing effects, and selection bias. Testing and selection effects are relevant if intervention effects are apparent. In light of the study's failure to find significant differences between the intervention and comparison group, the most important threat to internal validity was history. As a field experiment, no experimental isolation of the intervention from the dynamic life of the community was possible. There may have been unknown and unmeasured changes in community resources, provider attitudes and practice patterns, or changes within the Mexican American community that affected the study variables in unknown ways.

Another issue arising from the fact of ROMPP as a field experiment concerns the external validity of the study. The main threat here was the specificity of the setting. As a program evaluation, the data were specific to the circumstances particular to time, place, and personnel. The design was captive to the unique characteristics and historical situation of Klamath Falls, the Klamath County Health Department and their staff who delivered the intervention, the Mexican American population from which the sample was drawn, and the time period in which the study was conducted. Yet, as a study of a real-life intervention, it has greater external validity than a more controlled experimental design might have.

Generalization of the results of this study should consider factors which remain uncontrolled or unknown in this study. For instance, the kinds of crops grown in the area will affect when and for how much of the year agricultural work is, the physical rigor of the work, and whether the work is done in extreme conditions of heat or cold. These facts influence the income stability of seasonal agricultural workers, including how long or how easily a pregnant woman can continue to work and earn income, and whether there is motivation to migrate in search of work. Another unknown factor in this study is the community's attitudes toward agricultural workers, immigrants, members of minority groups, and Mexican Americans in particular. Another unanalyzed historical factor that might have influenced the results of this study includes the local activities of the Immigration and Naturalization Service during the intervention period.

Suggestions for Future Research

The intervention should be retested using some or all of the suggestions for expansion presented above, including improved marketing and patient education, measures to improve provider's cultural competence, and community organizing. Nurse researchers testing any intervention should conduct a power analysis to determine the optimal sample size (Baldwin & Chen, 1989). To obtain an adequate sample among a minority population in a rural area, they may want to consider a trial involving multiple sites. A trial over a longer time period is a less desirable option, as it would probably result in more contamination from historical factors. If a sufficient population from which to draw samples could be located, future researchers should consider a design featuring random assignment to the intervention and comparison groups.

In such a study, formal evaluation is needed of uncontrolled factors which could affect utilization over time such as: the economic environment; community services and attitudes; patterns of migration; national immigration policy and the local activities of the Immigration and Naturalization Service; provider attitudes toward the pregnant woman's cultural heritage, the provision of culturally appropriate educational materials, and the negotiation of culturally sensitive options for the plan of care. Such a project might want to include a more sophisticated evaluation of the participants' satisfaction with prenatal care in its design.

A future study may want to consider measuring other variables that might demonstrate the value of the intervention. Costs and benefits were measured in ROMPP, but the analysis has not yet been completed. It may be informative to know if ROMPP influenced rates of failed or "no-show" OB appointments, which represent an unreimbursed cost to the provider. In addition, the time frame for evaluation of the impact of ROMPP should be enlarged past the 28th day postpartum. Variables to consider in future research include: labor and delivery complications; postnatal complications affecting mother and/or infant; family planning participation (Atrash, 1995); completion of PKU screening; rates of breastfeeding; and rates of immunization.

In this study, there were significant concerns about the reliability of some of the data. Birth certificate data concerning initiation and utilization of prenatal care are considered a "gold standard," yet there has been little formal evaluation of its reliability and validity. The predictive validity of this data is apparent in the extensive literature, although somewhat less so for the Mexican American population. The reliability of each provider's method for gestational age dating is unknown. More research is necessary to improve the measurement of gestational age and determine the reliability of this measure (Alexander & Korenbrot, 1995). Also, the reliability of mothers' self-report of numerous variables, including the number and timing of prenatal visits, is unknown. More needs to be known about how self-report bias may compromise the accuracy of birth certificate data on the initiation and timing of prenatal visits.

In this study, the accuracy of medical record data for the number of emergency room visits, inpatient admissions, and initiation and timing of prenatal visits may have been compromised by missing forms and records, and errors in the abstraction and coding process. These errors are most likely to result in omitted or undercounted utilization of care, and would underestimate the absolute value of the variables based on these data. In the current study, it was assumed that these errors affected the quality of the data for the intervention and comparison groups equally. Future studies concerned with distribution of care should extract prenatal data directly from the prenatal care providers' records.

Further research is needed to explore the effects of different kinds of outreach and case-finding programs in different populations and settings. Proposals should be formulated to insure adequate staffing and resources to carry out the intervention and evaluation as intended.

It has been suggested that research concerning the utilization of prenatal care should look beyond issues of quantity toward indicators of content, combinations, and timing of care. These indicators include the provision of particular patient education messages, and early diagnosis of urinary tract infection and gestational diabetes. Other authors (Coria-Soto, Bobadilla, & Notzon, 1996) suggest that future studies look at the content of each visit, and focus on procedures which are performed serially, such as measurement of maternal weight, fundal height and blood pressure (p. 19). Research about the acceptability of prenatal care and patient satisfaction with care is also needed, particularly among Mexican Americans.

Studies which explore the relationship of utilization of care to how care is organized is needed. Specifically, the idea that screening glucose tolerance tests performed as part of routine prenatal care visits and charged as part of the prenatal care package present fewer barriers and will be utilized more than tests which require an additional visit and an additional charge, should be tested.

More research is needed which relates the utilization of prenatal care to the utilization of other services such as emergency rooms and inpatient stays. The finding in this study that ER use peaked in the second trimester among the ROMPP women, whereas in the comparison group ER use peaked in the third trimester is intriguing, and deserves attention in future research. Studies of ER utilization may also want to look at time of day to test the relationship of work hours to ER use. How prenatal care utilization is associated with use of health care services before and after pregnancy is also of interest.

Study Summary

Introduction

Early and adequate prenatal care is generally recognized as an effective means of reducing the incidence of low birthweight (LBW) and other negative pregnancy outcomes. Low income people face significant barriers in access to health care, including prenatal care.

Mexican American women have lower incomes, lower levels of education, less health insurance, higher fertility with high parity and short birth intervals, and receive less health and prenatal care than their Anglo counterparts (Balcazar, Hartner, & Cole, 1993; Williams, Binkin, & Clingman, 1986). These characteristics place them at higher risk for poor pregnancy outcomes than the population as a whole (Ventura & Taffel, 1985). Rural-dwelling Mexican Americans face many barriers to access, including poverty, language, and cultural differences (Jasis, 1987; Quesada, 1976; Quesada and Heller, 1977).

This study evaluated the effectiveness of the Rural Oregon Minority Prenatal Program (ROMPP) in improving the patterns of prenatal care utilization by rural-dwelling, low-income Mexican American women at risk of poor pregnancy outcomes. ROMPP was a federally funded trial of an intervention to provide nursing case management services and peer outreach to pregnant Mexican American women in a rural Oregon community.

Literature Review

The literature suggested that lower levels of prenatal care utilization correlate with higher rates of LBW (Greenberg, 1983; Gortmaker, 1979; Korenbrot, Simpson, & Phibbs, 1994; Leveno, Cunningham, Roark, Nelson, & Williams, 1985; Showstack, Budetti, & Minkler, 1984). There is a significant overlap in the sociodemographic variables which predict LBW, such as age, marital status, income, education, and rurality, and the utilization of prenatal care.

Hispanics in Oregon have a higher incidence of LBW than the state's Anglo population. Compared to the state's non-Hispanic Anglo population, Hispanic Oregonians have a 30% higher incidence of preterm births (less than 37 weeks gestation), 8.3% versus 6.4%; and a 13% greater incidence of LBW, 54.3 per 1,000 births, versus 48.0 per 1,000. Approximately 17% of Hispanic mothers, compared to 7% in the state, received inadequate prenatal care, and 2.1%, versus 0.9% for Caucasians, received no prenatal care at all (all data from Oregon Health Division, 1993).

The increased rate of preterm and LBW births among Hispanics has spurred concerned Oregon policy makers to search for policies and programs to address the disparity.

Much of the attention of policy makers has focused on improving the utilization of prenatal care.

Prenatal care utilization is related to sociodemographic, personal, and systemic barriers to prenatal care. Four studies were located that explored Mexican American women's perceptions of barriers to prenatal care (Gray, Lawrence, Arregui, Phillips, Bell, Richards, Fukushima, & Taeusch, 1995; Meikle, Orleans, Leff, Shain & Gibbs, 1995; Stewart, 1995; Zambrana, Dunkel-Schetter, & Scrimshaw, 1991). The studies reveal that Mexican American women face financial concerns, lack of knowledge about where to obtain care, dependence on overcrowded public clinics with their long waits for appointments and long clinic waiting times, transportation and child care problems, and language differences as barriers to prenatal care.

In addition, there are cultural and attitudinal barriers to care. Mexican American culture views pregnancy as a natural rather than medical condition, and may not be aware of the value of prenatal care for the prevention and/or early detection of complications (Alcalay, Ghee, & Scrimshaw, 1993; Jasis, 1987). There is often a delay in seeking prenatal care until symptoms arise, which may be exacerbated by an economic incentive and/or cultural preference to attempt various self-care measures and consult with family, friends, and perhaps traditional healers (Chavez, Cornelius, & Jones, 1986; DeWalt, 1973; Gaviria, Stern, & Schensul, 1982; Weaver, 1973).

There is an extensive literature describing and evaluating programs designed to improve the utilization of prenatal care by providing coordinated health and social services, community-based outreach and home visitation, and social support. Six articles described programs targeted to the Mexican American population. Three of the studies are purely descriptive. Two observational studies demonstrated the effectiveness of interventions to influence prenatal care utilization among Mexican Americans. In one, women who received prenatal care had a 6% rate of LBW, compared to 21% in the comparison group (Moore, Origel, Key, & Resnik, 1986). In the other, the percentage of women entering care during the first trimester increased from 35% to 51%, and the numbers receiving nine or more prenatal visits increased from 24% to 53% ($p = 0.009$) (Larson, McGuire, Watkins, & Mountain, 1992; Watkins, Larson, Harlan, & Young, 1990).

Conceptual Framework

The conceptual framework for this study had four elements: the Community Environment, the Client's Situation, the Intervention, and the Outcomes. The community environment is the setting in which the ROMPP intervention was implemented, Klamath County, in south central Oregon. The county is very rural. About 5% of the County's residents are Hispanic, and many are employed in seasonal farm work, mostly potatoes. The health care system in Klamath Falls was known to have a capacity adequate to absorb the projected increase in utilization stemming from the ROMPP intervention.

The Client's Situation is reflected in the demographic and biomedical variables included in this study. They were: age, education, parity, marital status, and country of origin. The presence of chronic illness prior to pregnancy, and/or pathological conditions arising during pregnancy were measured by the presence or absence of: anemia, gestational diabetes, pregnancy-induced hypertension, history of infants large or small for gestational age, renal disease, and Rh sensitization.

The ROMPP Intervention blended concepts of culturally appropriate care, outreach, nursing case management, and home visitation. Culturally appropriate care is care that acknowledges and incorporates the beliefs, values, and health practices of the client's native cultures. Culturally appropriate care was operationalized in ROMPP by an "outreach worker." She functioned as a cultural broker (Jezewski, 1990), and interpreted meanings of behaviors, customs, and events to both client and provider, facilitated communication, and enabled cooperation. The outreach worker was responsible for case-finding and recruitment, follow-up to ensure continuity of care and reduce social isolation, and advocacy to lower barriers and increase the acceptability and accessibility of care. The community health nurse/case manager (CHN) worked with the outreach worker to plan and implement nursing care, and facilitate the client's interaction with community health care and social service providers.

Most ROMPP visits occurred in the participants' homes. Assessment and interventions were based on Region X Prenatal Nursing Standards, directed at optimizing nutrition, elimination, sleep and rest, activity and exercise, knowledge about self-care, health care, and community resources, interpersonal relationships, coping and stress management, and personal.

From September 1991 to May 1994, ROMPP staff sought out and recruited high-risk, low-income pregnant Mexican American women residing in Klamath County. Factors which guided the determination of risk included: history of preterm or LBW infants; history of pregnancy complications, such as pregnancy-induced hypertension; substance abuse; preexisting medical conditions; and age less than 17 years. The intent of the intervention was to find and recruit women before 20 weeks of gestation. In practice, participants were recruited at any time during their pregnancy.

ROMPP staff approached potentially eligible women in the potato sheds, at grocery stores, and in neighbors' kitchens. Of 124 Mexican American women who were recruited into the project, 100 received a minimum of three antepartum CHN visits, and one postpartum CHN visit. These 100 women formed the intervention sample for this study.

The typical Mexican American ROMPP participant was 24 years old, born in Mexico, completed seven years of education, lived with the father of the baby, and had a monthly household income of about $630. Only 14% spoke English, and 54% were in this country without documentation. Forty-two percent of the ROMPP participants had not yet started prenatal care when they were enrolled in the program. Only one woman reported smoking cigarettes, and she quit during the first trimester.

The Outcomes focused on process-oriented measures related to the utilization of prenatal care. The overarching question guiding this study was: Did ROMPP improve patterns of prenatal care utilization by rural pregnant Mexican American women, compared to Mexican American women who did not receive the intervention?

Research Questions

Did women in the treatment group initiate prenatal care earlier in their pregnancies and have a more adequate number of visits than the comparison group? Were prenatal visits distributed throughout the pregnancies in a more appropriate way in the treatment group? Did women in the treatment group have fewer emergency room visits and fewer inpatient admissions during pregnancy? What were the diagnoses associated with these visits and admissions? When admitted, did women in the treatment group have shorter lengths of stay? Was the treatment group more likely to have screening serum glucose tests before 29 weeks of gestation?

Design and Methods

This quasi-experimental, retrospective study used birth certificate and medical record data. Data for the study were drawn from a larger data set that had already been collected to evaluate the overall benefits and costs of the ROMPP intervention.

To form the comparison group, birth certificate data from the Oregon State Health Division Department of Vital Statistics were used to select 100 women who had given birth in Klamath County between 1989 and 1991, the years prior to the ROMPP intervention. Chi square and *t* tests revealed no significant differences between the two groups in mothers' country of origin, age, marital status, parity, or years of education. Nor were there significant differences in the biomedical risk scores of the two groups.

This study was conducted under Institutional Review Board and informed consent guidelines. The consent and other study forms were translated and back-translated by two bilingual and bicultural members of the ROMPP staff to assure reliability and cultural relevance. Every effort to protect the confidentiality of all data was made throughout collection and analysis.

Results

The intervention group had a more appropriate distribution of prenatal visits, with more prenatal visits in months 2, 3, 4, 5, 6, and 7 than the comparison group ($p < 0.05$). The intervention group had a mean number of emergency room visits similar to the comparison group, but had more visits associated with respiratory diagnoses. ROMPP women had more inpatient admissions and longer lengths of stay, but the small number of hospitalizations precluded statistical inference. No statistically significant differences were found in the adequacy of initiation of prenatal care or the number of prenatal care visits as measured by Kotelchuck's (1994) Adequacy of Prenatal Care Utilization index, nor in the timing of screening serum glucose tests.

Discussion

The women in the intervention group had prenatal care visits more evenly distributed in the first and second trimesters of their pregnancies than the women in the comparison group, with statistically significant differences in the mean number of prenatal care visits in months 2, 3, 4, 5, 6, and 7 ($p < 0.05$). Yet the pattern of visits in the intervention and comparison groups was similar, that is, a slowly increasing mean number of visits throughout pregnancy. In this study, there was no evidence of the pattern of an early visit to confirm the pregnancy and then little or no follow-up prenatal care reported among pregnant women living in Tijuana (Alcalay, Ghee & Scrimshaw, 1993), and observed by this author in her clinical practice.

Two explanations for the lack of other statistically significant differences between the treatment and intervention groups are most likely. The first is the possibility that positive effects of the intervention were present but the small sample size had insufficient power to capture them. The other likely explanation is the persistence of barriers to prenatal care that the intervention was unable to surmount. These barriers include attitudes among both clients and providers, financial concerns, problems with transportation, and language differences.

The persistence of these barriers is supported by three other sources of data: (a) the Client Satisfaction Survey, filled out by every ROMPP participant in the postpartum period; (b) focus group data gathered at the end of the study to explore beliefs and attitudes about pregnancy and prenatal care and perceptions of ROMPP; and (c) post-study interviews with ROMPP staff.

ROMPP staff reported that the primary attitudinal barrier among participants was a culture-based tendency not to seek preventive services. Several ROMPP women commented about how much they appreciated the "orientation" to community resources such as prenatal care, WIC, and Adult and Family Services. ROMPP participants may have valued the risk assessment and referral aspects of the intervention more than the promotion of prenatal care in particular. Other comments in the CSS imply that some ROMPP participants may have viewed ROMPP as a substitute for prenatal care, e.g., "I liked the fact that they would come to my house and provided information as well as do a prenatal checkup." In the focus groups, women talked about how embarrassing it was to visit the doctor, not just the physical exam, but also the intimacy of the questions that they asked.

Attitudinal barriers may have existed on the provider's side as well. It was suggested by one ROMPP staffer that local health care providers were not accustomed to the demands of this patient population and faced little prospect of financial reward. Under these circumstances, the providers may have offered the minimum level of service. This level of service may not conform with ACOG guidelines (American College of Obstetricians and Gynecologists, 1992), on which the APNCU index is based.

ROMPP had little direct control of certain aspects of culturally appropriate care, such as provider attitudes toward the pregnant woman's cultural heritage, the provision of culturally appropriate educational materials, and the negotiation of culturally sensitive options for the plan of care. The extent to which these aspects were addressed by ROMPP staff in collaboration with participants and community providers is unknown.

Financial concerns appeared to remain a significant barrier to prenatal care, mentioned in all three sources of confirmatory data. ROMPP staff referred all who were eligible to third party sources of payment, but the 54% of the ROMPP participants who were undocumented immigrants had to rely on their own resources to pay for prenatal care. The ROMPP outreach worker assisted participants to make arrangements with Merle West Medical Center. The hospital assigned medically indigent pregnant women to providers on a rotating basis, and negotiated and received monthly payments for prenatal care packages on behalf of local prenatal care providers. Hospital admission and delivery charges were covered by Medicaid. But the ideas of packaged services, consumer credit, and monthly payments are not common in Mexico among rural residents and agricultural laborers. The ROMPP women may not have understood that the charge for the pregnancy care package was the same if they had three prenatal care visits or ten.

All sources mentioned transportation as a persistent problem. The problems were exacerbated for those who lived far away from their provider and those who didn't have a reliable mode of transportation. Staff reported that coordinating appointments and transportation with the 38% of ROMPP participants who didn't have telephones in their homes was difficult.

ROMPP staff reported continued problems with language barriers, particularly when ROMPP clients didn't have the OW's help. Focus group participants commented that the number of clinics with bilingual providers and/or auxiliary personnel has increased over the past few years, but it is unclear if these changes happened soon enough to influence the intervention. The medical charts showed that the hospital frequently used the AT&T translation services, but it is unknown to what extent the providers and participants used these services outside the hospital setting.

Other study results deserve comment as well. There were no significant differences between the two groups in emergency room (ER) use. Emergency room use may be difficult to influence in this population because many women must wait for their husbands or family members to return from work to get a ride into town, and are therefore unable to seek care during office hours. Finances are too tight to take time off work even when family members are ill.

ROMPP women had more antepartum inpatient admissions and longer lengths of stay than the comparison women. It appears that ROMPP participants may have had more hospital admissions because they had more contact with the health care system with more opportunities to be diagnosed with conditions that require inpatient management. Four of the six admissions for preterm labor in the intervention group were for a woman who was pregnant with twins. Without

ROMPP's assistance, this mother might have delivered much more prematurely, and had a more lengthy and costly inpatient stay for her premature infants. The current study was not designed to capture postnatal outcomes.

Limitations

The limitations of this study included significant concerns about the reliability of some of the data. Birth certificate data are considered a "gold standard," yet there has been little formal evaluation of its reliability and validity. The reliability of each provider's method for gestational age dating, and of maternal self-report, is unknown. The accuracy of medical record data may have been compromised by missing forms and records, and errors in the abstraction and coding process. While these errors are assumed to be affect the intervention and comparison groups equally, it is likely that the absolute value of the variables based on these data is underestimated.

Threats to internal validity included possible history effects. As a field experiment, no experimental isolation of the intervention from the dynamic life of the community was possible. The main threat to the external validity of the study is the specificity of the setting. As a program evaluation, the data were specific to the circumstances particular to time, place, and personnel. Yet, as a study of a real-life intervention, it has greater external validity than a more controlled experimental design might have.

Implications for Nursing Practice, Policy and Research

The ROMPP intervention should be expanded to address the persistent barriers to prenatal care. Nurses should increase their cultural competency, and sharpen their clinical focus on advocacy, marketing, facilitation of relationships between community groups, and community organizing. To truly address the problem of LBW, nurses must advocate comprehensive reforms including universal access to health care, measures to address persistent poverty, and immigration reform.

Among the recommendations for future research is the need for trials with sample sizes of sufficient power to capture the effects of the intervention, and designs featuring random assignment to the intervention and comparison groups. More research is needed which relates the utilization of prenatal care to the utilization of other health care services, and the use of health care services before and after pregnancy. Studies should capture more contextual information about the community in which the intervention is conducted. Future research concerning the utilization of prenatal care should look beyond issues of quantity toward indicators of content, quality, and acceptability of care.

Final Comments

Alexander and Korenbrot (1995) note that much of the research about prenatal care utilization, this study included, is presented in terms of a medical procedure provided in units of service called visits. This language reflects a point of view which "de-emphasizes the role of the mother, father, family and the community in fostering a social and physical environment that enhances a positive pregnancy process" (p. 113). A case-by-case approach tends to overlook population and community-based interventions.

Nurse clinicians and researchers will likely persist in using visit-based measures of utilization, because of their prevalence in the evaluation literature and relative ease of use. Yet the implications of this study suggest that the social, cultural and economic resources of the community must be better understood before truly effective programs to promote prenatal care utilization can be designed and implemented.

Despite its limitations, this study contributes new knowledge to the study of prenatal care utilization by Mexican Americans, and to the literature on community-based nursing interventions such as home visitation and case management. And this dissertation contributes to the knowledge nurses need to participate in the policy-making process. While the study is not definitive, it begins to fill some of the gaps in the extant literature, and helps clarify the next steps on the path to more effective, more culturally considerate care to <u>all</u> Oregon's residents.

REFERENCES

Alcalay, R., Ghee, A., & Scrimshaw, S. (1993). Designing prenatal care messages for low-income Mexican women. Public Health Reports, 108(3), 354-362.

Alexander, G.R., & Cornely, D.A. (1987). Prenatal care utilization: Its measurement and relationship to pregnancy outcome. American Journal of Preventive Medicine, 3(5), 243-253.

Alexander, G.R., & Korenbrot, C.C. (1995). The role of prenatal care in preventing low birth weight. The Future of Children, 5(1), 103-120.

Alexander, G.R., Petersen, D.J., Powell-Griner, E., & Tompkins, M.E. (1989). A comparison of gestational age reporting methods based on physician estimate and date of last normal menses from fetal death reports. American Journal of Public Health, 79(5), 600-602.

Alexander, G.R., Tompkins, M.E., & Cornely, D.A. (1990). Gestational age reporting and preterm delivery. Public Health Reports, 105(3), 267-275.

American College of Obstetricians and Gynecologists (1992). Standards for Obstetric-Gynecologic Services, 6th edition. Washington, DC: Author.

Andersen, R.M., Giachello, A.L., & Aday, L.A. (1986). Access of Hispanics to health care and cuts in services: A state-of-the-art overview. Public Health Reports, 101(3), 238-252.

Atrash, H.K. (1995). Not all prenatal care is appropriate care. Journal of the American Medical Womens' Association, 50(5), 144-145.

Bahry, V.J., Fullerton, J.T., & Lops, V.R. (1989). Provision of comprehensive perinatal services through rural outreach: A model program. Journal of Rural Health, 5(4), 387-396.

Balcazar, H., Aoyama, C., & Cai, X. (1991). Interpretive views on Hispanics' perinatal problems of low birth weight and prenatal care. Public Health Reports, 106(4), 420-426.

Balcazar, H., Cole, G., & Hartner, J. (1992). Mexican Americans' use of prenatal care and its relationship to maternal risk factors and pregnancy outcome. American Journal of Preventive Medicine, 8(1), 1-7.

Balcazar, H., Hartner, J., & Cole, G. (1993). The effects of prenatal care utilization and maternal risk factors on pregnancy outcome between Mexican American and non-Hispanic Whites. Journal of the National Medical Association, 85(3), 195-202.

Baldwin, K.A., & Chen, S.C. (1989). The effectiveness of public health nursing services to prenatal clients: An integrated review. Public Health Nursing, 6(2), 80-87.

Barnard, K. (1989). Region X nursing network prenatal and child health assessment manual. Seattle, WA: University of Washington.

Becerra, J.E., Hogue, C.J.R., Atrash, H.K., & Perez, N. (1991). Infant mortality among Hispanics: A portrait of heterogeneity. Journal of the American Medical Association, 265(2), 217-221.

Berry, J.W. (1980). Acculturation as varieties of adaptation. In A.M. Padilla (Ed.), Acculturation: Theory, models, and some new findings, (pp. 9-25). Boulder, CO: Westview Press.

Bollini, P. (1993). Health for immigrants and refugees in the 1990s. A comparative study in seven receiving countries. Innovation in Social Sciences Research, 6(1), 101-110.

Bollini, P., & Siem, H. (1995). No real progress towards equity: Health of migrants and ethnic minorities on the eve of the year 2000. Social Science and Medicine, 41(6), 819-828.

Bray, M.L., & Edwards, L.H. (1994). A primary health care approach using Hispanic outreach workers as nurse extenders. Public Health Nursing, 11(1), 7-11.

Buehler, J.W., Strauss, L., Hogue, C., & Smith, J. (1987). Birth weight-specific causes of infant mortality, United States, 1980. Public Health Reports, 102, 162-171.

Buescher, P.A., Smith, C., Holliday, J.L., & Levine, R.H. (1987). Source of prenatal care and infant birth weight: The case of a North Carolina county. American Journal of Obstetrics and Gynecology, 156, 204-210.

Buhang, H. (1992). Problems and prospects in the economic evaluation of antenatal care. International Journal of Technology Assessment in Health Care, 8(Suppl. 1), 49-56.

Burnam, M.A., Telles, C.A., Karno, M., Hough, R.L., & Escobar, J.I. (1987). Measurement of acculturation in a community population of Mexican Americans. Hispanic Journal of Behavioral Sciences, 9(2), 105-130.

Burton, D.A. (1993). Cost benefit analysis of nursing case management for pregnant minority women in rural Oregon:

A dissertation. Portland, OR: Oregon Health Sciences University.

Burton, D.A., & Curry, M.A. (n.d.). The Rural Oregon Minority Prenatal Project (a presentation abstract). Portland, OR: author.

Carrillo, J.M., Pust, R.E., & Borbon, J. (1986). Dar A Luz: A perinatal care program for Hispanic women on the U.S.-Mexico border. American Journal of Preventive Medicine, 2(1), 26-29.

Castro, F.G., Furth, P., & Karlow, H. (1984). The health beliefs of Mexican, Mexican American and Anglo American women. Hispanic Journal of Behavioral Sciences, 6(4), 365-383.

Chavez, L.R., Cornelius, W.A., & Jones, O.W. (1986). Utilization of health services by Mexican immigrant women in San Diego. Women and Health, 11(2), 3-20.

Clark, M. (1970). Health in the Mexican American culture. Berkeley, CA: University of California Press.

Cobas, J.A., Balcazar, H., Benin, M.B., Keith, V.M., & Chong, Y. (1996). Acculturation and low-birthweight infants among Latino women: A reanalysis of HHANES data with structural equation modeling. American Journal of Public Health, 86(3), 394-396.

Collins, Jr., J.W., & Shay, D.K. (1994). Prevalence of low birth weight among Hispanic infants with United States-born and foreign-born mothers: The effect of urban poverty. American Journal of Epidemiology, 139(2), 184-192.

Cooney, J. (1985). What determines the start of prenatal care? Medical Care, 23, 986-997.

Coria-Soto, I.L., Bobadilla, J.L., & Notzon, F. (1996). The effectiveness of antenatal care in preventing intrauterine growth retardation and low birth weight due to preterm delivery. International Journal for Quality in Health Care, 8(1), 13-20.

Curry, M.A. (1987). Access to prenatal care: Key to preventing low birthweight. Kansas City, MO: American Nurses' Association.

Curry, M.A. (1990). Factors associated with inadequate prenatal care. Journal of Community Health Nursing, 7(4), 245-252.

Darabi, K.F., & Ortiz, V. (1987). Childbearing among young Latino women in the United States. American Journal of Public Health, 77(1), 25-28.

David, R.J. (1980). The quality and completeness of birthweight and gestational age data in computerized birth files. American Journal of Public Health, 70(9), 964-973.

DeWalt, K.M. (1973). The illnesses no longer understand: Changing concepts of health and curing in a rural Mexican community. Medical Anthropology Newsletter, 8(2), 5-11.

Eberstein, I., & Pol, L. (1982). Mexican-American ethnicity, socio-economic status, and infant mortality: A county level analysis. Social Science Journal, 19,61-71.

Ernest, J.M., Michielutte, R., Meis, P.J., Moore, M.L., & Sharp, P. (1988). Identification of women at high risk for preterm-low birthweight births. Preventive Medicine, 17, 60-72.

Estrada, A.L., Treviño, F.M., & Ray, L.A. (1990). Health care utilization barriers among Mexican Americans: Evidence from HHANES 1982-84. American Journal of Public Health, 80(Suppl), 27-31.

Farge, E.J. (1977). A review of findings from "three generations" of Chicano health care behavior. Social Science Quarterly, 58(3), 407-411.

Ferreira, N.V. (1988). Prenatal care and birth weight in a Hispanic population. Unpublished master's thesis, Oregon Health Sciences University, Portland, Oregon.

Flegal, K.M., Launer, L.J., Graubard, B.I., Kestler, E., & Villar, J. (1993). Modeling maternal weight and height in studies of pregnancy outcome among Hispanic women. American Journal of Clinical Nutrition, 58, 145-151.

Forrest, J.D., & Singh, S. (1987). Timing of prenatal care in the United States: How accurate are our measurements? Health Services Research, 22(2), 235-253.

Furino, A., & Sumaya, C.V. (1992). Searching for solutions. In A. Furino (Ed.), Health policy and the Hispanic, (pp. 199-210). Boulder, CO: Westview Press.

Garza, R.T., & Gallegos, P.I. (1985). Environmental influences and personal choice: A humanistic perspective on acculturation. Hispanic Journal of Behavioral Sciences, 7(4), 365-379.

Gaviria, M., Stern, G., & Schensul, S.L. (1982). Sociocultural factors and perinatal health in a Mexican-American community. Journal of the National Medical Association, 74(10), 983-989.

Goldenberg, R.L., Patterson, E.T., & Freese, M.P. (1992). Maternal demographic, situational and psychosocial factors and their relationship to enrollment in prenatal care: A review of the literature. Women and Health, 19(2/3), 133-151.

Gordis, L., Kleinmen, J.C., Klerman, L.V., Mullen, P.D., & Paneth, N. (1990). Criteria for evaluating evidence regarding the effectiveness of prenatal interventions. In I.R. Merkatz, J.E. Thompson, P.D. Mullen, & R.L. Goldenberg (Eds.), New perspectives on prenatal care (pp. 31-38). New York: Elsevier.

Gordon, M. (1994). Nursing diagnosis: Process and application, 3rd. edition. St. Louis: Mosby.

Gortmaker, S.L. (1979). The effects of prenatal care upon the health of the newborn. American Journal of Public Health, 69(7), 653-660.

Gray, S., Lawrence, S., Arregui, A., Phillips, N., Bell, R., Richards, T., Fukushima, T., & Taeusch, H.W. (1995). Attitudes and behaviors of African-American and Mexican-American women delivering newborns in inner-city Los Angeles. Journal of the National Medical Association, 87, 353-358.

Green, B.J., & Higginson, G. (1989). Access to prenatal services for Oregon's low income women: A discussion of services in six selected counties. Oregon Health Division.

Greenberg, R.S. (1983). The impact of prenatal care on different social groups. American Journal of Obstetrics and Gynecology, 145(7), 797-801.

Guendelman, S. (1988). Sociocultural factors in Hispanic pregnancy outcome. In C.J. Morton & R.G. Hirsch (Eds.), Developing public health social work programs to prevent low birthweight and infant mortality: High risk populations and outreach (pp. 31-39). Rockville, MD: Department of Health and Human Services.

Guendelman, S. (1994). Mexican women in the United States. The Lancet, 344, 352.

Guendelman, S., Chavez, G., & Christianson, R. (1994). Fetal deaths in Mexican-American, Black, and White non-Hispanic women seeking government-funded prenatal care. Journal of Community Health, 19(5), 319-330.

Guendelman, S., Gould, J.B., Hudes, M., & Eskenazi, B. (1990). Generational differences in perinatal health among the Mexican American population: Findings from HHANES 1982-84. American Journal of Public Health, 80(Suppl.), 61-65.

Hahn, R.A., & Muecke, M.A. (1987). The anthropology of birth in five U.S. ethnic populations: Implications for obstetrical practice. Current Problems in Obstetrics, Gynecology, and Fertility, 10, 138-171.

Hahn, R.A., Mulinare, J., & Teutsch, S.M. (1992). Inconsistencies in coding of race and ethnicity between birth and death certificates in U.S. infants: A new look at infant mortality, 1983 through 1985. Journal of the American Medical Association, 267(2), 259-263.

Hansell, M.J. (1991). Sociodemographic factors and the quality of prenatal care. American Journal of Public Health, 81(8), 1023-1028.

Haynes, S.G., Harvey, C., Montes, H., Nickens, H., & Cohen, B.H. (1990). Patterns of cigarette smoking among Hispanics in the United States: Results from HHANES 1982-84. American Journal of Public Health, 80(Suppl), 47-53.

Heins, H.C., Jr., Nance, N.W., & Ferguson, J.E. (1987). Social support in improving perinatal outcome: The Resource Mothers program. Obstetrics and Gynecology, 70(2), 263-266.

Hu, D.J., & Covell, R.M. (1986). Health care usage by Hispanic outpatients as a function of primary language. Western Journal of Medicine, 144(4), 490-493.

Hughes, D., & Rosenbaum, S. (1989). An overview of maternal and infant health services in rural America. Journal of Rural Health, 5(4), 299-319.

Hughes, D.C., & Runyan, S.J. (1995). Prenatal care and public policy: Lessons for promoting women's health. Journal of the American Medical Women's Association, 50(5), 156-159, 163.

Huntington, J., & Connell, F.A. (1994). For every dollar spent: The cost-savings argument for prenatal care. New England Journal of Medicine, 331(19), 1303-1307.

Infante-Casteñeda, C. (1990). Utilización de servicios de atención prenatal: Influencia de la morbilidad percibida y de las redes sociales de ayuda. Salud Pública Méxicana, 32(4), 419-429.

Inglis, A.D. (1991). United States maternal and child health services, Part II: A comparison with Western Europe and strategies for change. Neonatal Network, 10(1), 7-13.

Institute of Medicine. (1988). Prenatal care: Reaching mothers, reaching infants. Washington, D.C.: National Academy Press.

James, S.A. (1993). Racial and ethnic differences in infant mortality and low birth weight: A psychosocial critique. Annals of Epidemiology, 3(2), 130-136.

Jasis, M. (1987). Perfil de opinion y uso de servicios de salud materno-infantil en Tijuana. Salud Pública Mexicana, 29(1), 73-83.

Jezewski, M.A. (1990). Culture brokering in migrant farmworker health care. Western Journal of Nursing Research, 12(4), 497-513.

Kay, M.A. (1977). Health and illness in a Mexican American barrio. In E.H. Spicer (Ed.), Ethnic medicine in the Southwest. Tucson, AZ: University of Arizona Press.

Kay, M.A. (1978). The Mexican American. In A. Clark (Ed.), Culture, Childbearing, Health Professionals (pp. 88-108). Philadelphia, PA: F.A. Davis.

Kay, M.A. (1980). Mexican, Mexican American, and Chicana childbirth. In Melville, M.A.. (Ed.), Twice a Minority: The Chicano woman in America, (pp. 52-65). St. Louis, MO: Mosby.

Kay, B.J., Share, D.A., Jones, K., Smith, M., Garcia, D., & Yeo, S.A. (1991). Process, costs, and outcomes of community-based prenatal care for adolescents. Medical Care, 29(6), 531-542.

Keefe, S.E., & Padilla, A.M. (1987). Chicano ethnicity. Albuquerque, NM: University of New Mexico Press.

Kelly, I. (1965). Folk practices in North Mexico. Austin, TX: University of Texas Press.

Kessner, D.M., Singer, J., Kalk, C.E., & Schlesinger, E.R. (1973). Infant death: An analysis by maternal risk and health care (Contrasts in health status ed., Vol. 1). Washington, D.C.: Institute of Medicine.

Kogan, M.D., Alexander, G.R., Kotelchuck, M., & Nagey, D.A. (1994). Relation of the content of prenatal care to the risk of low birth weight: Maternal reports of health behavior advice and initial prenatal care procedures. Journal of the American Medical Association, 271(17), 1340-1345.

Kogan, M.D., Kotelchuck, M., Alexander, G.R., & Johnson, W.E. (1994). Racial disparities in reported prenatal care advice from health care providers. American Journal of Public Health, 84(1), 82-88.

Kogan, M.D., Kotelchuck, M., & Johnson, S. (1993). Racial differences in late prenatal care visits. Journal of Perinatology, 13(1), 14-21.

Korenbrot, C.C. (1984). Risk reduction in pregnancies of low-income women: Comprehensive prenatal care through the OB Access Project. Mobius, 4(3), 34-43.

Korenbrot, C.C., Simpson, L., & Phibbs, C.S. (1994). Prenatal care needs assessment comparing service use and outcomes in Fresno, CA. Public Health Reports, 109(1), 68-76.

Kotelchuck, M. (1994a). An evaluation of the Kessner Adequacy of Prenatal Care Index and a proposed Adequacy of Prenatal Care Utilization index. American Journal of Public Health, 84(9), 1414-1420.

Kotelchuck, M. (1994b). The Adequacy of Prenatal Care Utilization Index: Its U.S. distribution and association with low birthweight. American Journal of Public Health, 84(9), 1486-1489.

Kramer, M.S., McLean, F.H., Boyd, M.E., & Usher, R.H. (1988). The validity of gestational age estimation by menstrual dating in term, preterm, and posterm gestations.

Journal of the American Medical Association, 260(22), 3306-3308.

Larson, K., McGuire, J., Watkins, E., & Mountain, K. (1992). Maternal care coordination for migrant farmworker women: Program structure and evaluation of effects on use of prenatal care and birth outcome. Journal of Rural Health, 8(2), 128-133.

Leatherman, J., Blackburn, D., & Davidhizar, R. (1990). How postpartum women explain their lack of obtaining adequate prenatal care. Journal of Advanced Nursing, 15, 256-267.

Lennie, J.A., Klun, J.R., & Hausner, T. (1987). Low birth weight reduced by the OB Access Project. Health Care Financing Review, 8(3), 83-86.

Leppert, P.C., & Namerow, P.B. (1985). Costs averted by providing comprehensive prenatal care to teenagers. Journal of Nurse-Midwifery, 30(5), 285-289.

Leveno, K.J., Cunningham, F.G., Roark, M.L., Nelson, S.D., & Williams, M.L. (1985). Prenatal care and the low birth weight infant. Obstetrics and Gynecology, 66, 599-605.

Lia-Hoagberg, B., Rode, P., Skovholt, C.J., Oberg, C.N., Berg, C., Mullett, S., & Choi, T. (1990). Barriers and motivators to prenatal care among low-income women. Social Science and Medicine, 4, 487-495.

Magaña, A., & Clark, N.M. (1995). Examining a paradox: Does religiosity contribute to positive birth outcomes in Mexican Merican populations? Health Education Quarterly, 22(1), 96-109.

Malloy, M.H., Kao, T., & Lee, Y.J. (1992). Analyzing the effect of prenatal care on pregnancy outcome: A conditional approach. American Journal of Public Health, 82(3), 448-450.

Markides, K.S., & Coreil, J. (1986). The health of Hispanics in the southwestern United States: An epidemiologic paradox. Public Health Reports, 101(3), 253-265.

Markides, K.S., Ray, L.A., Stroup-Benham, C.A., & Treviño, F. (1990). Acculturation and alcohol consumption in the Mexican American population of the southwestern United States: Findings from HHANES 1982-84. American Journal of Public Health, 80,(Suppl), 42-46.

McCormick, M.C., Brooks-Gunn, J., Shorter, T., Holmes, J.H., Wallace, C.Y., & Heagerty, M.C. (1989). Outreach as case finding: Its effect on enrollment in prenatal care. Medical Care, 27(2), 103-111.

McDonald, T.P., & Coburn, A.F. (1988). Predictors of prenatal care utilization. Social Science and Medicine, 27(2), 167-172.

McFarlane, J. (1996). *De Madres A Madres*: An access model for primary care. American Journal of Public Health, 86(6), 879-880.

McLaughlin, F.J., Altemeier, W.A., Christensen, M.J., Sherrod, K.B., Dietrich, M.S., & Stern,, D.T. (1992). Randomized trial of comprehensive prenatal care for low-income women: Effect on infant birth weight. Pediatrics, 89(1), 128-132.

Meikle, S.F., Orleans, M., Leff, M., Shain, R., & Gibbs, R.S. (1995). Women's reasons for not seeking prenatal care: Racial and ethnic factors. Birth, 22(2), 81-86.

Mendoza, R.H. (1984). Acculturation and sociocultural variability. In J.L. Martinez, Jr., & R.H. Mendoza (Eds.), Chicano psychology 2nd ed., (pp. 61-75). Orlando, FL: Academic Press.

Metcoff, J., Costiloe, P., Crosby, W.M., Dutta, S., Sandstead, H.H., Milne, D., Bodwell, C.E., & Majors, S.H.

(1985). Effect of food supplementation (WIC) during pregnancy on birth weight. American Journal of Clinical Nutrition, 41, 933-947.

Moore, P., & Hepworth, J.T. (1994). Use of perinatal and infant health services by Mexican-American Medicaid enrollees. Journal of the American Medical Association, 272(4), 297-304.

Moore, T.R., Origel, W., Key, T.C., & Resnik, R. (1986). The perinatal and economic impact of prenatal care in a low-socioeconomic population. American Journal of Obstetrics and Gynecology, 154, 29-33.

Mustard, C.A., & Roos, N.P. (1994). The relationship of prenatal care and pregnancy complications to birthweight in Winnipeg, Canada. American Journal of Public Health, 84(9), 1450-1457.

Nagey, D.A. (1989). The content of prenatal care. Obstetrics and Gynecology, 74(3), 516-528.

National Commission to Prevent Infant Mortality (1988). Infant mortality: Care for our children, care for our future. Washington, D.C.: Author.

Nesbitt, T.S., Connell, F.A., Hart, L.G., & Rosenblatt, R.A. (1990). Access to obstetric care in rural areas: Effect on birth outcome. American Journal of Public Health, 80(7), 814-818.

Norbeck, J.S., & Anderson, N.J. (1989). Psychosocial predictors of pregnancy outcomes in low-income Black, Hispanic, and White women. Nursing Research, 38(4), 204-209.

Oakley, A., Rajan, L., & Grant, A. (1990). Social support and pregnancy outcome. British Journal of Obstetrics and Gynaecology, 97(2), 155-162.

Oakley, A. (1991). Using medical care: The views and experiences of high-risk mothers. Health Services Research, 26(5), 651-669.

Olds, D.S., Henderson, C.R., Jr., Tatelbaum, R., & Chamberlin, R. (1986). Improving the delivery of prenatal care and outcomes of pregnancy: A randomized trial of nurse home visitation. Pediatrics, 77(1), 16-28.

Olds, D.L., & Kitzman, H. (1990). Can home visitation improve the health of women and children at environmental risk? Pediatrics, 86(1), 108-116.

Olds, D.L., & Kitzman, H. (1993). Review of research on home visiting for pregnant women and parents of young children. In The future of children: Home visiting, 3(3), 53-92. Los Altos, CA: The Center for the Future of Children, The David and Lucile Packard Foundation.

Oregon Health Division (1991). _Oregon county public health profiles_. Portland, OR: author.

Oregon Health Division (1993). _Hispanic Oregonian births, 1989-1991_. Portland, OR: author.

Oregon Health Division (1992). _Oregon vital statistics annual report, 1992, Volume I: Natality, induced terminations of pregnancy, teen pregnancy_. Portland, OR: author.

Oregon Health Division (1995). _Oregon vital statistics annual report, 1993, Volume 1: Natality, induced terminations of pregnancy, teen pregnancy_. Portland, OR: author.

Peoples, M.D., Grimson, R.C., & Daughtry, G.L. (1984). Evaluation of the effects of the North Carolina Improved Pregnancy Outcome Project: Implications for state-level decision-making. _American Journal of Public Health_, _74_(6), 549-554.

Peoples, M.D., & Siegel, E. (1983). Measuring the impact of programs for mothers and infants on prenatal care and birthweight: The value of refined analyses. Medical Care, 21(6), 586-608.

Peoples-Shep, M.D., Kalsbeek, W.D., & Siegel, E. (1988). Why we know so little about prenatal care nationwide: An assessment of required methodology. Health Services Research, 23(3), 359-380.

Piper, J.M., Mitchel, Jr., E.F., & Ray, W.A. (1996). Evaluation of a program for prenatal care case management. Family Planning Perspectives, 28(2), 65-68.

Poland, M.L., Ager, J.W., & Olson, J.M. (1987). Barriers to receiving adequate prenatal care. American Journal of Obstetrics and Gynecology, 157, 297-303.

Poland, M.L., Giblin, P.T., Waller, Jr., J.B., & Hinkin, J. (1992). Effects of a home visiting program on prenatal care and birthweight: A case comparison study. Journal of Community Health, 17(4), 221-229.

Powell-Griner, E., & Streck, D. (1982). A closer examination of neonatal mortality rates among the Texas Spanish surname population. American Journal of Public Health, 72, 993-999.

Quesada, G.M. (1976). Language and communication barriers for health delivery in a minority group. Social Science and Medicine, 10, 323-327.

Quesada, G.M., & Heller, P.L. (1977). Sociocultural barriers to medical care among Mexican Americans in Texas: A summary report of research conducted by the Southwest Medical Sociology Ad Hoc Committee. Medical Care, 15(5 Suppl), 93-101.

Rodriguez, R., McFarlane, J., Mahon, J., & Fehir, J. (1993). *De Madres A Madres*: A community partnership to increase access to prenatal care. Bulletin of the PAHO, 403-407.

Rubel, A. (1960). Concepts of disease in Mexican American culture. American Anthropologist, 62, 795-814.

St.Clair, P.A., Smeriglio, V.L., Alexander, C.S., & Celenteno, D.D. (1989). Social network structure and prenatal care utilization. Medical Care, 27(8), 823-832.

Salmon, M.E., & Peoples-Sheps, M. (1989). Infant mortality and public health nursing: A history of accomplishments, a future of challenges. Nursing Outlook, 37(1), 6-7,51.

Sardell, A. (1990). Child health policy in the U.S.: The paradox of consensus. Journal of Health Politics, Policy and Law, 15, 271-304.

Schlesinger, M., & Kronebusch, K. (1990). The failure of prenatal care policy for the poor. Health Affairs, 9(4), 91-111.

Schreiber, J.M., & Homiak, J.P. (1981). Mexican Americans. In A. Harwood (Ed.), Ethnicity and medical care, pp. 264-336. Cambridge, MA: Harvard University Press.

Scribner, R., & Dwyer, J.H. (1989). Acculturation and low birthweight among Latinos in the Hispanic HANES. American Journal of Public Health, 79(9), 1263-1267.

Selby, M.L., Lee, E.S., Tuttle, D.M., & Loe, Jr., H.D. (1984). Validity of the Spanish surname infant mortality rate as a health status indicator for the Mexican American population. American Journal of Public Health, 74(9), 998-1002.

Showstack, J., Budetti, P.P., & Minkler, D. (1984). Factors associated with birth weight: An exploration of the roles of prenatal care and length of pregnancy. American Journal of Public Health, 174, 1003-1008.

Solis, J.M., Marks, G., Garcia, M., & Shelton, D. (1990). Acculturation, access to care, and use of preventive services by Hispanics, Findings from HHANES 1982-84. American Journal of Public Health, 80(Suppl), 11-19.

Southgate, M. (1993). A study of prenatal care and low birth weight among migrant and seasonal farm workers in Oregon. Unpublished master's thesis, University of Washington, Seattle, Washington.

Stewart, M. (1995). Special program fails to improve Mexican American women's access to and adequacy of prenatal care. Family Planning Perspectives, 27(1), 44-45.

Strobino, D.M., Chase, G.A., Kim, Y.J., Crawley, B.E., Salim, J. H., & Baruffi, G. (1986). The impact of the Mississippi Improved Child Health Project on prenatal care and low birthweight. American Journal of Public Health, 76(3), 274-278.

Swartz, M.K. (1990). Infant mortality: Agenda for the 90s. Journal of Pediatric Health Care, 4(4), 169-174.

Thompson, J.E., Walsh, L.V., & Merkatz, I.R. (1990). The history of prenatal care: Cultural, social, and medical contexts. In I.R. Merkatz, J.E. Thompson, P.D. Mullen, &

R.L. Goldenberg (Eds.), New perspectives on prenatal care, (pp. 9-30). New York: Elsevier.

Thompson, M.A. (1995). Unpublished manuscript.

Tyson, J., Guzick, D., Rosenfeld, C.R., Lasky, R., Gant, N., Jiminez, J., & Heartwell, S. (1990). Prenatal care evaluation and cohort analysis. Pediatrics, 85(2), 195-204.

Ventura, S.J., & Taffel, S.M. (1985). Childbearing characteristics of U.S. and foreign-born Hispanic mothers. Public Health Reports, 100(6), 647-652.

Villar, J., Farnot, U., Barros, F., Victoria, C., Langer, A., & Belizan, J.M. (1992). A randomized trial of psychosocial support during high-risk pregnancies. New England Journal of Medicine, 327(18), 1266-1271.

Warrick, L.H., Wood, A.H., Meister, J.S., & de Zapien, J.G. (1992). Evaluation of a peer health worker prenatal outreach and education program for Hispanic farmworker families. Journal of Community Health, 17(1), 13-26.

Watkins, E.L., Larson, K., Harlan, C., & Young, S. (1990). A model program for providing health services for migrant farmworker mothers and children. Public Health Reports, 105(6), 567-575.

Weaver, J.L. (1973). Mexican American health care behavior: A critical review of the literature. Social Science Quarterly, 54(1), 85-102.

Williams, R.L., Binkin, N.J., & Clingman, E.J. (1986). Pregnancy outcomes among Spanish-surname women in California. American Journal of Public Health, 76(4), 387-391.

Willis, W.O., & Fullerton, J.T. (1991). Prevention of infant mortality: An agenda for nurse-midwifery. Journal of Nurse-Midwifery, 36(6), 343-354.

Wise, P. (1994). What you measure is what you get: Prenatal care and women's health (Editorial). American Journal of Public Health, 84(9), 1374-1375.

York, R., Grant, C., Gibeau, A., Beecham, J., & Kessler, J. (1996). A review of problems of universal access to prenatal care. Nursing Clinics of North America, 31(2), 279-292.

Young, C., McMahon, J., Bowman, V., & Thompson, D. (1989). Maternal reasons for delayed prenatal care. Nursing Research, 38(4), 242-243.

Zambrana, R.E., Dunkel-Schetter, C., & Scrimshaw, S. (1991). Factors which influence use of prenatal care in low-income racial-ethnic women in Los Angeles County. Journal of Community Health, 16(5), 283-295.

Appendix A

State of Oregon Birth Certificate

ent black ink
e handbook for
instructions

OREGON DEPARTMENT OF HUMAN RESOURCES
HEALTH DIVISION
Vital Records Unit

CERTIFICATE OF LIVE BIRTH

Local File Number

136-

SAMPLE

CHILD

1 CHILD—NAME First Middle Last
2 SEX
3a DATE OF BIRTH (Month, Day, Year)
3b TIME OF BIRTH M
4a FACILITY—NAME (If not in hospital or clinic, give address)
4b CITY, TOWN, OR LOCATION OF BIRTH
4c COUNTY OF BIRTH

CERTIFIER

I certify that this child was born alive at the place and time and on the date stated above
5a SIGNATURE ▶
5b DATE SIGNED (Month, Day, Year)
5c CERTIFIER—NAME AND TITLE (Type or print)
5d NAME AND TITLE OF ATTENDANT AT BIRTH IF OTHER THAN CERTIFIER (Type or print)
5e ATTENDANT MAILING ADDRESS (Street, city or town, state, zip)
6a DATE FILED BY REGISTRAR
6b REGISTRAR SIGNATURE ▶

SAMPLE

MOTHER

7a MOTHER—NAME First Middle Last
7b MAIDEN SURNAME
7c DATE OF BIRTH
7d STATE OF BIRTH (If not in U.S.A., name country)
8a RESIDENCE—STATE
8b COUNTY
8c CITY, TOWN, OR LOCATION
8d STREET AND NUMBER
8e INSIDE CITY LIMITS (Yes or no)
8f ZIP CODE
9 MOTHER'S MAILING ADDRESS AND ZIP CODE (If same as above, leave blank)

FATHER

10a FATHER—NAME First Middle Last
10b DATE OF BIRTH
10c STATE OF BIRTH (If not in U.S.A., name country)

INFORMANT

I certify that the personal information provided on this certificate is correct to the best of my knowledge and belief. (Signature of Parent or other Informant)
11 ▶

ITEM CORRECTED	CORRECTED TO READ	DOCUMENTARY EVIDENCE	REVIEWED BY

INFORMATION FOR MEDICAL AND HEALTH USE ONLY

12 Shall abstract of birth certificate be made available for publication or business contact lists? (Check one) ☐ No ☐ Yes
13 Social Security Number Requested? ☐ No ☐ Yes

STATE USE ONLY
a. ______ b. ______ c. ______ d. ______

14. OF HISPANIC ORIGIN? (Specify No or Yes) If yes, specify Cuban, Mexican, Puerto Rican, etc.
MOTHER 14a ☐ No ☐ Yes Specify
FATHER 14b ☐ No ☐ Yes Specify

15. RACE—(e.g. White, Black, American Indian, etc.) (Specify below)
15a
15b

16. EDUCATION (Highest grade completed) Elementary or Secondary (0-12) College (1-4 or 5+)
16a
16b

17 MOTHER MARRIED? (At birth, conception, or any time between) (Yes or no) ☐ No ☐ Yes

18. HAS A CLOSE RELATIVE OF THIS NEWBORN HAD A HEREDITARY HEARING LOSS THAT EXISTED SINCE CHILDHOOD? ☐ No ☐ Yes

19. APGAR SCORE
19a 1 min. 19b 5 min.

20. BIRTH WEIGHT (Specify units)

21 PREGNANCY HISTORY
LIVE BIRTHS (Do not include this child)
21a. Now living Number ____ None ☐
21b. Now dead Number ____ None ☐
21c. DATE OF LAST LIVE BIRTH (Month, Year)
OTHER TERMINATIONS (Spontaneous and induced)
21d. Number ____ None ☐
21e. DATE OF LAST OTHER TERMINATION (Month, Year)

22 CLINICAL ESTIMATE OF GESTATION (Weeks)

23 DATE LAST NORMAL MENSES BEGAN (Month, Day, Year)
24a. PLURALITY—Single, twin, triplet, etc. (Specify)
24b. IF NOT SINGLE BIRTH—Born first, second, third, etc. (Specify)
25. MONTH OF PREGNANCY PRENATAL CARE BEGAN First, second, etc. (Specify)
26. PRENATAL VISITS—Total number (If none, so state)

27 SITE—PRENATAL CARE (Check all that apply)
☐ Private Clinic Office ☐ Co. Health Dept. ☐ Other Public ☐ Other

28. PRIMARY FINANCIAL COVERAGE OF THIS DELIVERY
☐ Insurance ☐ Self pay ☐ Public Assistance ☐ Other

29 TYPE OF THIS REPORT

SAMPLE

30. NEWBORN REQUIRED INTERMEDIATE OR INTENSIVE CARE? ☐ No ☐ Yes

31. NEWBORN TRANSFERRED FOR MEDICAL NEED? (If Yes, enter name of facility transferred to) ☐ No ☐ Yes

32. MONTHS MOTHER ON WIC PROGRAM? (0-9)

33 [illegible] THIS PREGNANCY
(Check [illegible])
- 01 ☐ Anemia (Hct. [illegible] 10)
- 02 ☐ Cardiac disease
- 03 ☐ Acute or chronic lung disease
- 04 ☐ Diabetes (Chronic)
- 05 ☐ Diabetes (Gestational)
- 06 ☐ Genital herpes
- 07 ☐ Hydramnios/Oligohydramnios
- 08 ☐ Hemoglobinopathy
- 09 ☐ Hypertension, chronic
- 10 ☐ Hypertension, pregnancy associated
- 11 ☐ Eclampsia
- 12 ☐ Incompetent cervix
- 13 ☐ Previous infant 4000 + grams
- 14 ☐ Previous preterm or small for gestational age infant
- 15 ☐ Renal disease
- 16 ☐ Rh sensitization
- 17 ☐ Uterine bleeding
- 18 ☐ No history available
- 00 ☐ None
- 19 ☐ Other (Specify) ______

34 COMPLICATIONS OF LABOR AND/OR DELIVERY
(Check all that apply)
- 01 ☐ Febrile (> 100 F. or 38 C.)
- 02 ☐ Meconium, moderate heavy
- 03 ☐ Premature rupture of membrane (>12 hours)
- 04 ☐ Abruptio placenta
- 05 ☐ Placenta Previa
- 06 ☐ Other excessive bleeding
- 07 ☐ Seizures during labor
- 08 ☐ Precipitous labor (<3 hours)
- 09 ☐ Prolonged labor (>20 hours)
- 10 ☐ Dysfunctional labor
- 11 ☐ Breech/Malpresentation
- 12 ☐ Cephalopelvic disproportion
- 13 ☐ Cord prolapse
- 14 ☐ Anesthetic complications
- 15 ☐ Fetal distress
- 00 ☐ None
- 16 ☐ Other (Specify) ______

35 OTHER FACTORS FOR THIS PREGNANCY
(Complete all items)
- a. Tobacco use during pregnancy No ☐ Yes ☐
- b. Average number cigarettes per day ______
- c. Alcohol use during pregnancy No ☐ Yes ☐
- d. Average number drinks per week ______
- e. Weight gained during pregnancy ______ lbs.
- f. History available No ☐ Yes ☐
- g. Other (Specify) ______

36 ANTENATAL PROCEDURES
(Check all that apply)
- 01 ☐ Amniocentesis
- 02 ☐ Tocolysis
- 03 ☐ Ultrasound
- 04 ☐ No history available
- 00 ☐ None
- 05 ☐ Other (Specify) ______

37 INTRAPARTUM PROCEDURES
(Check all that apply)
- 01 ☐ Electronic fetal monitoring
- 02 ☐ Induction of labor
- 03 ☐ Stimulation of labor
- 00 ☐ None
- 04 ☐ Other (Specify) ______

38 CONDITIONS OF THE NEWBORN
(Check all that apply)
- 01 ☐ Anemia (Hct. <39/Hgb. <13)
- 02 ☐ Birth injury
- 03 ☐ Fetal alcohol syndrome
- 04 ☐ Hyaline membrane disease/RDS
- 05 ☐ Meconium aspiration syndrome
- 06 ☐ Assisted ventilation (<30 min.)
- 07 ☐ Assisted ventilation (≥30 min.)
- 08 ☐ Seizures
- 00 ☐ None apparent
- 09 ☐ Other (Specify) ______

39 METHOD OF DELIVERY
(Check all that apply)
- 01 ☐ Vaginal
- 02 ☐ Vaginal birth after previous C-section
- 03 ☐ Primary C-section
- 04 ☐ Repeat C-section
- 05 ☐ Forceps
- 06 ☐ Vacuum

40 CONGENITAL ANOMALIES OF NEWBORN
(Check all that apply)
- 01 ☐ Anencephalus
- 02 ☐ Spina bifida/Meningocele
- 03 ☐ Hydrocephalus
- 04 ☐ Microcephalus
- 05 ☐ Other central nervous system anomalies (Specify) ______
- 06 ☐ Heart malformations
- 07 ☐ Other circulatory/respiratory anomalies (Specify) ______
- 08 ☐ Rectal atresia/stenosis
- 09 ☐ Tracheo-esophageal fistula/Esophageal atresia
- 10 ☐ Omphalocele/Gastroschisis
- 11 ☐ Other gastrointestinal anomalies (Specify) ______
- 12 ☐ Malformed genitalia
- 13 ☐ Renal agenesis
- 14 ☐ Other urogenital anomalies (Specify) ______
- 15 ☐ Cleft lip/palate
- 16 ☐ Polydactyly/Syndactyly/Adactyly
- 17 ☐ Club foot
- 18 ☐ Diaphragmatic hernia
- 19 ☐ Other musculoskeletal/integumental anomalies (Specify) ______
- 20 ☐ Down Syndrome
- 21 ☐ Other chromosomal anomalies (Specify) ______
- 00 ☐ None apparent
- 22 ☐ Other (Specify) ______

45-1 (1-89)

Appendix B

ROMPP Medical Record Data Collection Forms

ROMPP COST DATA SUMMARY SHEET

Date____________ **Completed by**________________
Delivery Site______________________________
Patient ID #_______________ **ROMPP ID#**____________________
(hospital record #) (ROMPP/Intervention moms)
Birth Certificate #__________________ (comparison moms only)
Baby's Birthdate____________________

Cost Data Form Summary

(*Please record the total number of each type of form used for this mother/infant pair- - if none of a given form were used, record "0" in the appropriate space)*

Form # 1: "Maternal Prenatal Outpatient Flowsheet"
*(GREEN PAPER)*____

Form # 2: "Maternal Inpatient Prenatal Flowsheet"
*(~~BUF~~F PAPER)*____
Lavendar

Form # 3: "Maternal Labor & Delivery/Postpartum Flowsheet"
*(PINK PAPER)*____

Form # 4: "Infant Post Delivery Flowsheet"
*(BLUE PAPER)*____

Form # 5: "Maternal Inpatient Postpartum Flowsheet"
*(YELLOW PAPER)*____

NOTES:____

MATERNAL PRENATAL OUTPATIENT FLOWSHEET p. 1 of 3

data collector initials:____ date of data collection:__________ Study ID #:___________

Patient ID#:___________ Clinic site:_____________ Hospital:______________

Pregnancy Care:

	Date:	Date:	Date:	Date:
MD Scheduled:				
brief				
intermediate				
extended				
MD Unscheduled:				
brief				
intermediate				
extended				
NP / CNM Scheduled:				
brief				
intermediate				
extended				
NP / CNM Unscheduled:				
brief				
intermediate				
extended				
RN Visit:				
Lab Only:				
Rx:				
Other:				

Transport? ☐ yes ☐ no if yes, to / from where?

MATERNAL PRENATAL OUTPATIENT FLOWSHEET p. 2 of 3

data collector initials:____ date of data collection:__________ Study ID #:___________

Procedures:	Date:	Date:	Date:	Date:
Labs:				
Ultrasound:				
Amniocentesis:				
Non-stress Test:				
Other X-Ray:				
Other Procedures:				

Non-Pregnancy Care:	Date:	Date:	Date:	Date:
Unscheduled MD:				
brief				
intermediate				
extended				
Unscheduled NP:				
brief				
intermediate				
extended				
CONTINUED:				
Urgency Care:				
brief				
intermediate				

MATERNAL PRENATAL OUTPATIENT FLOWSHEET p. 3 of 3

data collector initials:____ date of data collection:__________ Study ID #:___________

Non-Pregnancy Care:	Date:	Date:	Date:	Date:
extended				
Health Dept.:				
brief				
intermediate				
extended				

Transport? ☐ yes ☐ no if yes, to / from where?

Treatments / procedures:	Date:	Date:	Date:	Date:
Rx / IVs:				
Labs:				
Xrays:				

Other:

MATERNAL INPATIENT PRENATAL FLOWSHEET p. 1 of 2
(hospital)

data collector initials:____ date of data collection:__________ Study ID #:___________

Patient ID#:___________ Clinic site:_____________ Hospital:______________

Emergency:				
			Date / minutes:	Date / minutes:
Brief Visit Dx:				
Intermediate Visit Dx:				
Extended Visit Dx:				
Transport? ☐ yes ☐ no if yes, to / from where?				
Treatments / procedures:	Date / minutes:	Date / minutes:	Date / minutes:	Date / minutes:
Rx / IVs:				
Labs:				
Xrays / Ultrasound:				

MATERNAL INPATIENT PRENATAL FLOWSHEET p. 2 of 2

(hospital)

data collector initials:____ date of data collection:__________ Study ID #:___________

Patient ID#:___________ Clinic site:_____________ Hospital:______________

Inpatient Admit:				
			Date:	Date:
Ward Dx:				
ICU Dx:				
Other Admission Dx:				
Transport? ☐ yes ☐ no if yes, to / from where?				
Treatments / procedures:	Date:	Date:	Date:	Date:
Rx / IVs:				
Labs:				
Xrays / Ultrasound:				
Other:				

MATERNAL LABOR & DELIVERY / POSTPARTUM FLOWSHEET p 1 of 3

data collector initials:______date of data collection:__________studyID#:__________

Patient ID#:___________ Clinic site:___________ Hospital:______________

Labor -- Dx:			# hours:	
Treatments / procedures:	Date:	Date:	Date:	Date:
Rx / IVs / Blood Products:				
Labs:				
X-rays / Ultrasound:				
Complications / Other:				

Delivery				
Delivery -- Dx:			# hours:	
weeks gestation @ delivery:			birthweight:	
Treatments / procedures:	Date:	Date:	Date:	Date:

MATERNAL LABOR & DELIVERY / POSTPARTUM FLOWSHEET

data collector initials:______date of data collection:__________studyID#:__________

Delivery				
Rx / IVs / Blood Products:	Date:	Date:	Date:	Date:

Narcotics? ☐ yes ☐ no if yes, how many doses?	Assisted delivery? ☐ yes ☐ no if yes, how?
Anesthesia? ☐ yes ☐ no Epidural? ☐ yes ☐ no Intrathecal? ☐ yes ☐ no	Pitocin? ☐ yes ☐ no Augmentation? ☐ yes ☐ no Induction? ☐ yes ☐ no
Prostaglandin gel? ☐ yes ☐ no if yes, how many doses?	$MgSO_4$? ☐ yes ☐ no if yes, how many hours?
Antibiotics? ☐ yes ☐ no if yes, how many doses?	Insulin? ☐ yes ☐ no if yes, how many doses?
Amniotic infusion? ☐ yes ☐ no	Fetal Scalp Sample? ☐ yes ☐ no

Monitoring: how long?	FHT	UTC	
Internal			
External			
NOTES:			

Labs:	Date:	Date:	Date:	Date:
X-rays / Ultrasound:				

MATERNAL LABOR & DELIVERY / POSTPARTUM FLOWSHEET p 3 of 3

data collector initials:______date of data collection:__________studyID#:___________

Delivery	
Complications / Other:	
Number of hours from admission to delivery:	
Significant other present? ☐ yes ☐ no	ROMPP staff present? ☐ yes ☐ no
notes:	

INFANT POST DELIVERY FLOWSHEET

p. 1 of 2

304

Study ID#:____________ data collector initials:_________ date of data collection:______________

Patient ID #:____________ Clinic Site:_______________ Hospital:_______________

Infant immediate post delivery:
Nursery, Dx:
NICU Dx:
Medical Risk, Nurs Dx:
Other Admission, Dx:

Pediatrician present at delivery? ☐ yes ☐ no	Breast feeding at discharge? ☐ yes ☐ no
Resuscitation at delivery? ☐ yes ☐ no	

Procedures / treatments:			
Bilirubin lights? ☐ yes ☐ no	O_2 ? ☐ yes ☐ no	Umbilical cath? ☐ yes ☐ no	
Cardiac apnea monitor? ☐ yes ☐ no	for how long?	Ventilator? ☐ yes ☐ no	for how long?

Other:					
Rx / IVs / Blood Products: (list)	Date:	Date:	Date:	Date:	Date:
X-rays:					
Transport:					

Emergency Dept:		
	Date / # minutes	Date / # minutes
Brief visit, Dx:		
Intermediate visit, Dx:		
Extended visit, Dx:		
Transport: ☐ yes ☐ no when?	to where?	
Treatments / procedures:	Date / # minutes	Date / # minutes

INFANT POST DELIVERY FLOWSHEET p. 2 of 2

Study ID#:____________ data collector initials:_________ date of data collection:______________

Emergency Dept:

Treatments / procedures continued:	Date / minutes	Date / minutes
Rx / IVs / Blood Products: (list)		
Lab: (list)		
X-rays:		

Readmission / Inpatient admit:	Date:	Date:
Ward Dx:		
ICU Dx:		
Other admit Dx:		
Transport: ☐ yes ☐ no when:	to where?	

Treatments / procedures:	Date:	Date:	Date:	Date:	Date:
Rx / IVs / Blood Products: (list)					
Lab: (list)					
X-rays:					

MATERNAL INPATIENT POSTPARTUM FLOWSHEET

p. 1 of 2

(Delivery through 28 days pp)

data collector initials:____ date of data collection:__________ Study ID #:___________

Patient ID#:___________ Clinic site:_____________ Hospital:______________

Emergency:		
	Date / minutes:	Date / minutes:
Brief Visit Dx:		
Intermediate Visit Dx:		
Extended Visit Dx:		
Transport? ☐ yes ☐ no if yes, to where?		

Treatments / procedures:	Date / minutes:	Date / minutes:	Date / minutes:	Date / minutes:
Rx / IVs:				
Labs:				
Xrays / Ultrasound:				

MATERNAL INPATIENT POSTPARTUM FLOWSHEET

p. 2 of 2

(Delivery through 28 days pp)

data collector initials:____ date of data collection:__________ Study ID #:___________

Patient ID#:___________ Clinic site:_____________ Hospital:______________

Inpatient Admit:		
	Date:	Date:
Ward Dx:		
ICU Dx:		
Other Admission Dx:		
Transport? ☐ yes ☐ no if yes, to / from where?		

Treatments / procedures:	Date:	Date:	Date:	Date:
Rx / IVs:				
Labs:				
Xrays / Ultrasound:				

Appendix C

ROMPP Code Book and Computer Entry Forms

DIAGNOSES

Antenatal Dxs:

787	R/O ruptured membranes
788	Vaginitis
789	Twins
790	Incompetent cervix
791	Equivocal constraction stress test
792	Nonreactive stress test
793	Lowlying placenta with vaginal bleeding
794	Decreased fetal movement
795	Round ligament pain
796	Chorioamnionitis
797	Threatened abortion
798	Preterm ROM
799	Vaginal bleed of unknown origin
800	TAB
801	SAB
802	Fetal demise
803	Preterm labor/uterine irritability
804	Oligohydramnios
805	Polyhydramnios
806	Preeclampsia/PIH/Pregnancy-induced hypertenstion
807	Isoimmunization
808	Placenta previa
809	Hyperemesis gravidarum

Labor Dxs:

810	SROM
811	PROM/Prolonged ROM
812	Prodromal labor/false labor
813	Precipitous delivery
814	Occipital Posterior
815	Transverse position
816	Breech position
817	Shoulder dystocia/soft tissue dystocia [labor dx?]
818	Failed induction
819	Placental abruption
820	Nonreassuring fetal tracing/fetal distress/late decels
821	Cephalopelvic disproportion (CPD)
823	Nuchal cord

824 Knotted cord
825 Prolonged labor
826 Failure to progress
827 Dysfunctional labor
828 Malpresentation

Delivery Dxs:

830 Perineal laceration
832 Cervical laceration

Neonatal Dxs:

840 AGA/Term infant/Normal Newborn/Robust
841 SGA
842 LGA
843 Postdates newborn
844 IUGR
845 Neonatal demise
846 Poor Apgar
847 Newborn rash
848 Meconium aspiration
849 Undescended testicle
850 Respiratory depression/birth depression
851 Persistent hyperplastic primary viterus
852 Hip dysplasia
853 Feeding difficulty
854 Hyperbilirubinemia/neonatal jaundice
855 Newborn assessment in emergency room, normal results
856 Admit to special care nursery
857 Cleft lip
858 ABO incompatibility
859 Meconium-stained amniotic fluid
860 Preterm infant
861 Ventricular septal defect (VSD)
862 Umbilical hernia
863 Patent mesenteric duct
864 Hyaline membrane disease
865 Macrosomia
866 Dislocated/fractured sternocleidomastoid
867 Anencephaly
868 Hypoglycemia
869 Cocaine-affected infant

PP Dxs:

870	Endometritis
872	Mastitis
874	Hemorrhage
876	Postpartum depression
877	Postpartum uterine atony
878	Retained products of conception

Other Dxs:

892	Mental status changes
893	r/o Cardiac defect
894	Polycythemia
895	Dental complaint/toothache
896	Hypocalcemia
897	Intussception
898	Rectal bleeding
899	Kidney stone/renal calculus
900	UTI
901	Pyelonephritis
902	Proteinuria
903	Anemia
904	Gastroenteritis/Gastritis
905	Migraine/headache
906	Fainting/syncope
907	Hyperventilation
908	Lower abdominal pain/Pelvic pain
909	Otitis media (externa)
910	Nausea/Vomiting
911	Difficulty breathing
912	Chest pain
913	Dehydration
914	R/O sepsis
915	Neonatal fever
916	Tachypnea (transient)
917	Purulent rhinitis with upper airway obstruction
918	Pneumonitis/Pneumonia
919	E. coli
920	Vesicular rash/Erythema toxicum
921	Sinus infection
922	MVA
923	Chickenpox
924	Hemorrhoids

925	Fascitis
926	Vulvar varicosities
927	Skene's duct cyst
928	DES exposure
929	Herpes
930	HTN
931	IDDM
932	AODM
933	Epilepsy
934	Hepatitis
935	Syphilis
936	Gonorrhea
937	Chlamydia
938	Rubella
939	Tomoplasmosis
940	CMV
941	Abnormal Pap
942	Uterine fibroids
943	Thrush
944	Viral syndrome
945	Respiratory syncitial virus (RSV)
946	Gestational diabetes
947	Appendicitis
948	Monilia
949	Pharyngitis/Tonsillitis
950	Bronchitis
951	Facial paralysis
952	Pyloric stenosis
953	Maternal drug overdose
954	Fracture
955	Cervicitis
956	Polydactyly
957	Colic/irritable baby
958	Hematuria
959	R/O pregnancy (ER dx)
960	URI
961	Interpersonal physical trauma (fights, domestic violence)
962	Conjunctivitis
963	Lymphadenitis
964	Diarrhea
965	Vomiting blood
966	Peridontia
967	Foreign body in ear

968	Burn
969	Tenosynovitis
970	Flu
971	Psychosocial crisis/Emotional trauma
972	Ingrown toenail
973	Cellulitis
974	Muscle spasm/back pain/costochondriasis
975	Soft tissue injury
976	Ear pain
977	Thrombocytopenia
978	Thalessemia
979	Fall
980	Pelvic inflammatory disease (PID)
981	Infection, details unknown/umbilical infection
982	R/O Labor
983	Hives, allergic reactions/wound follow-up/dermatitis
984	Constipation
985	+ Beta-strep
986	Hypovolemia
987	Recheck in ER
988	Trichomonas
989	Crush injury to hand or foot, with fracture
990	Respiratory distress/SOB (not newborn)
991	Mercury injection
992	Brachial plexus palsy
993	Breast mass
994	Epistaxis (nosebleed)
995	HELLP syndrome
996	Trisomy 21
997	Reflux esophagitis
998	Retained products of conception
999	Meningocele
500	Laceration other than OB
501	Alcohol abuse
502	Neck pain
503	Venous thrombosis or r/o
504	Asthma
505	Choleycystitis
506	Pneumothorax
507	Hydrocele
508	Endocervical polyp

ROMPP COST BENEFIT DATA ENTRY FORM

ENTERED ________

VERIFIED ________

ID# ________ Birth certificate ________ DOB ________ GEST AGE ________ 2 ________ 3 ________

ANTEPARTUM (Green sheets)

[redacted]	____					"Doses"
T101	____	T201	____	T301	____	____
T102	____	T202	____	T302	____	____
T103	____	T203	____	T303	____	____
T104	____	T204	____	T304	____	____
T105	____	T205	____	T305	____	____
T106	____	T206	____	T306	____	____
T107	____	T207	____	T307	____	____
T108	____	T208	____	T308	____	____
T109	____	T209	____	T309	____	____
T110	____	T210	____	T310	____	____
T111	____	T211	____	T311	____	____
T112	____	T212	____	T312	____	____
T113	____	T213	____	T313	____	____
T114	____	T214	____	T314	____	____
T115	____	T215	____	T315	____	____
T116	____	T216	____	T316	____	____
T117	____	T217	____	T317	____	____
T118	____	T218	____	T318	____	____
T119	____	T219	____	T319	____	____
T120	____	T220	____	T320	____	____

LABOR (Pink sheets)

[redacted]	____		
LABDX01	____	LABOR15	____
LABDX02	____	LABOR16	____
LABDX03	____	LABOR17	____
LABCOM01	____	LABOR18	____
LABCOM02	____	LABOR19	____
LABCOM03	____	LABOR20	____
LABOR01	____		
LABOR02	____		
LABOR03	____		
LABOR04	____		
LABOR05	____		
LABOR06	____		
LABOR07	____		
LABOR08	____		
LABOR09	____		
LABOR10	____		
LABOR11	____		
LABOR12	____		
LABOR13	____		
LABOR14	____		

ROMPP COST BENEFIT DATA ENTRY FORM

ID# ________

DELIVERY (Pink sheets)

DELDX01 ____
DELDX02 ____
DELDX03 ____
[redacted] ____
WKSGEST ____
BWLBS ____
BWOZS ____
BWGMS ____
DELTYPE ____
LOSMOM ____
NARCOTIC ____
ANES ____
PROSTA ____
ANTIBIO ____
AMNINFUS ____
ASSIST ____
[redacted] ____
AUGMENT ____
INDUCT ____
MGSO4 ____
INSULIN ____

SCALP ____
FHTINT ____
FHTEXT ____
UCTINT ____
UCTEXT ____
COMPLIC ____
ADMITDEL ____
SOPRES ____
ROMPPRES ____

"Doses"

DEL01 ________ ________
DEL02 ________ ________
DEL03 ________ ________
DEL04 ________ ________
DEL05 ________ ________
DEL06 ________ ________
DEL07 ________ ________
DEL08 ________ ________
DEL09 ________ ________
DEL10 ________ ________
DEL11 ________ ________
DEL12 ________ ________
DEL13 ________ ________
DEL14 ________ ________
DEL15 ________ ________
DEL16 ________ ________
DEL17 ________ ________
DEL18 ________ ________
DEL19 ________ ________
DEL20 ________ ________

BABY (Blue sheets)

[redacted] ____
NURSDX01 ____
NURSDX02 ____
NICUDX01 ____
NICUDX02 ____
RISKDX ____
OTHERDX ____
LOSBABE ____
PEDPRES ____
RESUSDEL ____
BREAST ____
BILI ____
O2 ____
UMBICATH ____
APNEAMON ____
VENT ____
NN01 ____
NN02 ____
NN03 ____
NN04 ____
NN05 ____
NN06 ____
NN07 ____
NN08 ____

NN09 ____
NN10 ____
NN11 ____
NN12 ____
NN13 ____
NN14 ____
NN15 ____
NN16 ____
NN17 ____
NN18 ____
NN19 ____
NN20 ____
NN21 ____
NN22 ____
NN23 ____
NN24 ____
NN25 ____
NN26 ____
NN27 ____
NN28 ____
NN29 ____
NN30 ____

ROMPP COST BENEFIT DATA ENTRY FORM

ID# ________ Birth certificate ____________ DOB ________

ENTERED ________

VERIFIED ________

ER VISITS
(Buff sheets)

[redacted] ______

MOMBABE ______

VISIT ______

ERDX01 ______

ERDX02 ______

ERDX03 ______

ER01 ______

ER02 ______

ER03 ______

ER04 ______

ER05 ______

ER06 ______

ER07 ______

ER08 ______

ER09 ______

ER10 ______

ER11 ______

ER12 ______

ER13 ______

ER14 ______

ER15 ______

ER16 ______

ER17 ______

ER18 ______

ER19 ______

NN20 ______

ER21 ______

ER22 ______

ER23 ______

ER24 ______

ER25 ______

ER26 ______

ER27 ______

ER28 ______

ER29 ______

ER30 ______

INPATIENT STAY
(Buff or blue sheets)

[redacted] ______

WARDICU ______

MOMBABE ______

INPTDX01 ______

INPTDX02 ______

INPTDX03 ______

INPTDX04 ______

INPTDX05 ______

LOSINPT ______

		"Doses"
IP01	______	______
IP02	______	______
IP03	______	______
IP04	______	______
IP05	______	______
IP06	______	______
IP07	______	______
IP08	______	______
IP09	______	______
IP10	______	______
IP11	______	______
IP12	______	______
IP13	______	______
IP14	______	______
IP15	______	______
IP16	______	______
IP17	______	______
IP18	______	______
IP19	______	______
IP20	______	______

Appendix D

Consent Forms

Proyecto Prenatal De Minorias Rurales
De Oregon
Forma de Concentimiento

Yo, ______________________________ doy mi concentimiento para participar en el proyecto de casos prenatales de minorias en Oregon. Entiendo que una enfermera de la comunidad y una educadora de salùd me visitaràn en mi casa durante mi embarazo y me haràn preguntas acerca de mi salùd y la salùd de mi bebe. Mis respuestas seràn escritas y se usaràn para el proposito de estadisticas y èsta informaciòn no sera compartida con nadie fuera de esta proyecto [ni con emmigracion].

Mi participaciòn con este proyecto no intervendra con qualquier tratamiento mèdico que recibo en presente o que recibirè en el futuro.

Si yo particip en este pryecto, yo recibiré un regalò al principo y otro al fin de mi embarazo

Las preguntas que se me han dado se han escrito a mi satisfacciòn

Firma ____

Fecha ____

Testigo____

Traducciòn al Español hecha
por____

Rural Oregon Minortiy Prenatal Project
Consent Form

I, ______________________________ agree to participate in the Rural Oregon Minority Prenatal Project. I understand that a public health nurse and a health educator will be visiting me at home during my pregnancy, and will ask me questions about my health, and the health of my baby. The answers I give will be written down by the nurse or health educator and will be used by the project for statistical purposes only, and will not be shared with Immigration or with anyone outside of the project without my permission.

I understand that my participation in this project is of my own choosing. I also understand that my participation in this project will not interfere with any other medical or health treatments or services that I receive now, or choose to receive in the near future.

If I agree to participate, I will receive a gift when I enroll and another gift when my baby is born.

Any questions I have about this project have been answered to my satisfaction.

Signature____

Date: ____

Witness:____