THE POTENTIAL INFLUENCE OF MATERNAL EMPLOYMENT ON OBSTETRICAL HEALTH CARE SEEKING BEHAVIOR ACROSS THE RURAL-URBAN CONTINUUM

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Executive Summary

In analyzing travel patterns for medical care, it is generally assumed that patients/consumers exclusively travel from home to seek care. We speculate that this basic assumption should be re-evaluated for obstetrical care given observed changes in female participation rates among child-bearing aged women in the US. Related literature is introduced and used to develop the dimensions of the potential influence of maternal employment on obstetrical health care seeking behavior as well as pertinent research questions and their corresponding hypotheses to guide future research efforts. Finally, a vulnerable study population is suggested and potential policy implications for the suggested line of research are discussed.

Background

When and where a woman seeks obstetrical care (prenatal through delivery) may depend heavily on where she works and the type and duration of her work (Moore, 1980; Hibbard & Pope, 1985). Where a woman works can also be an important determinant of her level of access to other health care services as well. This is especially important in rural communities where travel to work can be over great distances and in a direction opposite to that of the closest available health care providers to the woman's home. The role of maternal employment as a potential barrier to health care access has not been directly investigated in an empirical sense despite the fact that it intuitively seems to be an important consideration. There is indirect support that health care utilization, and the use of perinatal services, in particular, is affected by the conditions of employment in studies of maternal employment in the literature of labor economics, in studies of the effects of distance and travel opportunities on the use of services in the medical geography literature, and the effects of multiple intervening factors of use of health care services in the studies of access and health behavior. Those studies will be described in this article. This paper reviews studies of access and use of services to determine how much is known about the relationship

between maternal employment and the use of obstetrical services and whether geography—rural or urban residence—may combine with employment to create a barrier to service.

The influence of maternal employment has to be understood in the context of a substantial increase since the post-World War II era in the female labor force participation rate here in the US. The observed increase in female labor force participation is particularly pronounced among women with children (Makuc, 1983; Lehrer & Nerlove, 1986). Important implications for social services related to child bearing and child rearing are portended by such a structural change in workforce commitment by women (mothers and caregivers). This change in the makeup of the US workforce also has important implications for health care delivery. The magnitude of the increase in female labor force participation rates suggests that, to the extent that workplace and the opportunity costs of competing time demands influence health care decisions, both the influence and the effect of maternal employment on obstetrical health care seeking behavior may be substantial.

To address these issues of the observed increase in female participation in the US labor force, historical trends over the past three decades were examined. Because these increases have continued, studies of access and use of services that included employment as a correlate even 20 years ago may understate its effects on obstetrical care seeking. However, previous studies can provide important clues as to how distance and employment may create difficulty for mothers in seeking care. Access to care for working women is also a function of specific job characteristics (e.g., job flexibility, full- vs. part-time) and personal attributes (e.g., income, insurance, education, race) that affect provider choice and the initiation of and/or compliance with obstetrical care. Whether these factors have been proven to affect use of services will be explored.

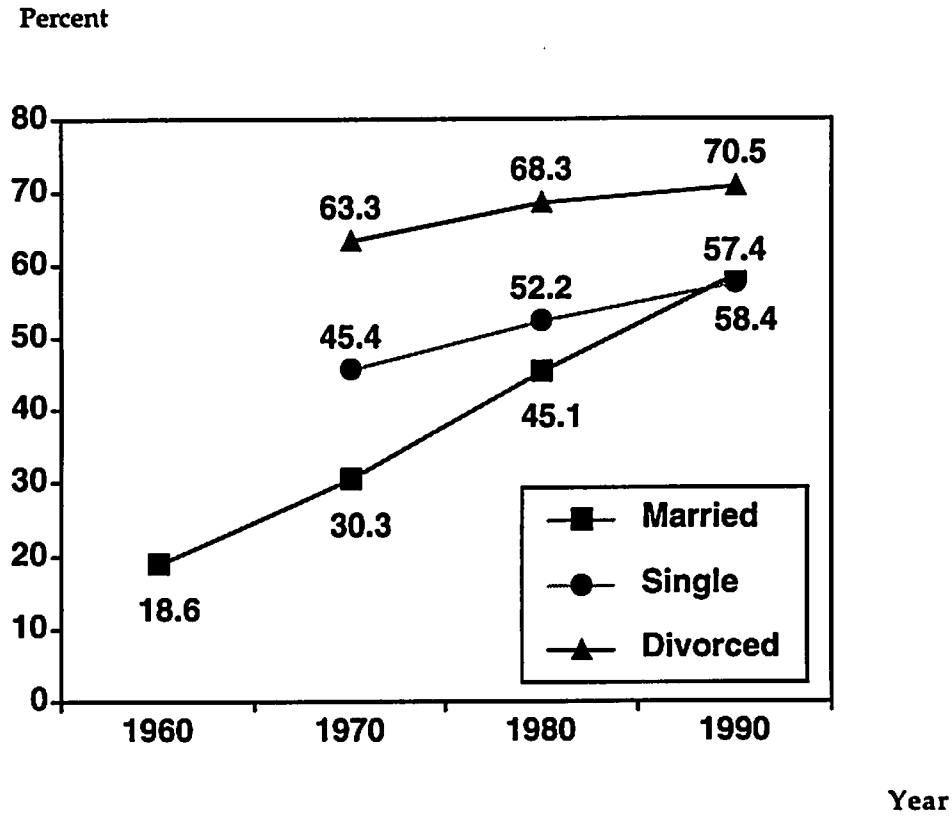
Female Participation in the Labor Force

Given the substantial increases in female labor force participation rates, it seems likely that maternal employment may influence a woman's obstetrical health care seeking behavior because work hours mirror provider office hours for many working women. Figure 1 depicts the growth of female participation in the labor force by marital status for women with children less

than 6 years of age. Moreover, increasing trends in labor force participation are observed for all women, irrespective of marital status and presence of children. (Figure 1 is limited to 1960-1990 because data were unavailable for earlier periods in the Single and Divorced categories.) It can be seen from Figure 1 that the US labor force participation rate for females is at an all time high over this 30-year period across all categories of marital status. At the same time, the participation rate among divorced females remains higher in all time periods. This very large change in the structure of women's lives exhibited by substantial increases in female labor force

Figure 1

US Female Labor Force Participation by Marital Status with Children <6



U.S. Bureau of the Census, Statistical Abstract of the United States, Washington, DC, 1991, page 391.

participation suggests that it may be wise to reconsider conclusions about how we might plan or legislate access to obstetrical care for working women if access is found to be strongly related to work place and work burden. The extent to which women's work hours mirror operating hours for obstetrical care clinics constrains the available time that women have to seek care.

Dimensions of Potential Influence

The two distinct aspects associated with the overall potential influence of maternal employment on obstetrical health care seeking behavior are:

(1) provider choice; and

(2) adequacy of care.

Each of these aspects—provider choice and adequacy of care—of the relationship between maternal employment and obstetrical health care seeking behavior subsumes an array of issues and potential correlates that can be drawn from the literature. For instance, provider choice as a general label includes issues of provider type/specialty, provider location, office hours, and institutional affiliation. Adequacy of care is similarly related to a set of issues that includes whether care is sought at all, when care is initiated, how much care is used, and compliance with provider recommendations. While provider choice and adequacy of care remain separate aspects, they are bound together in such a way as to make it difficult to sort out those factors that are likely to predict one or both. This proposition is developed more fully later. In building up to the conceptual framework and statement of hypotheses presented the latter section of this paper, however, it is first necessary to consider the importance of obstetrical care access with respect to maternal employment.

Access to prenatal care has shown a slowly declining pattern over recent years in some indicators such as the percent of pregnant women who received first trimester care (US NCHS, 1990, 1991, 1993). The substantial increase of female participation in the labor force has not appeared to have had a dramatic effect on indicators of access although persistently negative outcomes among certain groups persist despite targeted policy initiatives. These indicators have not been examined by residence or by employment status in the standard reports of the National Center for Health

Statistics which tracks these trends. Depending upon race and age, between 8.8 and 20.2 percent of women who were pregnant or had delivered responding to the 1988 National Maternal and Infant Health Survey report difficulty in obtaining prenatal care (Milman, 1993). Women between the ages of 18 and 19 years report the highest rates of difficulty in obtaining prenatal care as do women with less education. These women will most likely be involved in some form of work. Unfortunately, the National Maternal and Infant Health Survey did not collect data on the relative location of providers and the respondents' workplace. The sample was inadequate for the purposes of assessing rural-urban differences in access to prenatal and delivery services.

The focus of the article is not to identify the relationship of work patterns with the ultimate indicators of access, including use of services, but rather to explore whether there is an effect on patterns of use by the relative location of employer, residence, and provider. This question is important to policy makers who, being shown data that correlates outcomes to providers may be drawing erroneous conclusions concerning who is actually being served by whom.

Contributions from the Literature

Where a woman works may influence the timing, amount, and location of obstetrical care (prenatal through delivery) that she seeks (Moore, 1980; Chamberlain, 1993). Where a woman works may also be an important determinant of her level of access to health care services (Kelley et al., 1990). Workplace location relative to home and provider location could be a potential structural barrier to health care access using the classification presented by Millman (1993). Barriers to access were categorized into three basic types: structural barriers that "are impediments to medical care directly related to the number, type, concentration, location, or organizational configuration of health care providers; financial barriers may restrict access either by inhibiting the ability of patients to pay for needed medical services or by discouraging physicians and hospitals from treating patients of limited means; and personal and cultural barriers may inhibit people who need medical attention from seeking it or, once they obtain care, from following recommended post treatment guidelines" (Millman, 1993, page 39). Maternal employment may serve as a structural barrier in this way because women may have trouble taking

time off from work or desire to save their sick leave until after their babies are born. While workplace location relative to home and provider location may be a structural barrier to obstetrical care access, it has not been directly investigated in empirical research. Nevertheless, the relationship between maternal employment and health care utilization intuitively seems to be an important consideration.

There is indirect support that can be found in those studies reviewed in the following section suggesting that health care utilization among women, and the use of perinatal services, in particular, is affected by employment. Support for differences in utilization among employed versus unemployed women can be found in studies of maternal employment in the literature of sociology and epidemiology, in studies of the effects of distance and travel opportunities on the use of services in the medical geography literature, and studies of consumer choice and health behaviors showing the effects of multiple intervening factors on the use of health care services. This section reviews these studies to determine how much is known about the relationship between maternal employment and the use of obstetrical services with a particular focus on bypassing behavior and access to care as indicated by adequacy of care (Millman, 1993). The primary goal is to establish whether geography may combine with employment to influence where and when women choose to seek obstetrical care services.

Traditionally, distance to care has been assessed as the distance from place of residence to provider and/or facility (Morrill & Earickson, 1968; Shannon et al., 1969; Morrill, Earickson & Rees, 1973; Shannon et al., 1979; Mayer, 1983; William's et al., 1983; Nesbitt et al., 1993). Hogan (1988) found that patients with higher case mix indices were more likely to travel outside of their counties of residence in rural New York. In examining bypassing behavior among Medicare beneficiaries, researchers found that characteristics of the facility as well as the patient were important in explaining why some patients used the nearest hospital and others did not (Adams & Wright, 1991). Specific to obstetrical care, multivariate analyses of hospital discharge data examining choice of hospital found obstetrics services to be more sensitive to travel time than the choice of a hospital for other inpatient services (Cohen & Lee, 1983; McGuirk & Porell, 1984). This

finding is most likely a function of the associated planning horizon such that the use of obstetrical services tend to be planned further in advance than the use of other inpatient services. Recent studies that exclusively examined obstetrical health care outmigration patterns are summarized in Table 1.

Table 1

Summary of Recent Studies of Obstetrical Health Care Outmigration

Author(s)	Year	Scale of Analysis	Data Source
Wyoming Division of Health and Medical Services	1989	County	Birth Certificates
Nesbitt, TS, FA Connell et al.	1990	County	Hospital Data, Birth Certificates
Bronstein, JM and MA Morrisey	1991	County	Alabama Hospital Discharge Database
Thompson, JG	1994	County	Birth Certificates
Reed, FW, WH McBroom et al.	1994	County	Birth Certificates
Reed, FW, WH McBroom, SH Sperry	1994	County	Birth Certificates

In each of these studies, outmigration was assessed in terms of county of residence versus county of delivery. While controlling for such variables as income, education, and race, none of these studies considered maternal employment, which most likely was unavailable in the datasets used in conducting their analyses. In an unpublished study of county outmigration patterns in North Carolina (Savitz, 1991), the percentage of county residents outmigrating for work was found to be a statistically significant predictor of the proportion of resident births occurring in another county. This exploratory work contributed to the refinement of hypotheses and the statistical approach suggested herein that seeks to address specific research questions concerning the relation of residence and workplace location to individual obstetrical health care seeking behavior.

The distinction between bypassing care and outmigration is an important distinction that is primarily an issue of scale. Bypassing studies rely on individual-level assessment and analysis while outmigration studies rely on aggregate data. Outmigration studies are limited in that they do not contribute to our understanding of individual access in terms of the relative proximity and/or availability of local providers; however, outmigration studies do increase our understanding of patient flows across geopolitical borders.

Studies of access in the discipline of geography and the fields of health services research and health planning have focused on the distance between consumer (patient) residences and provider locations, ignoring the potential importance of workplace location; one prominent exception was a study concerning activity spaces and distances traveled to primary source of health care by Gesler & Meade (1988). They found: "Significant differences... among the 20 survey clusters, suggesting that specific geographic locations are important in health care-seeking behavior...If people tend to use health care facilities near the places where they work or shop, then their distance from home to health care is not a very good measure of accessibility (page 460)."

Additionally, some insurers have acknowledged in practice the importance of workplace location in health care delivery. For instance, Kaiser Permanente has considered workplace location in its location planning for freestanding ambulatory surgery centers (Anderson, 1992). Major national studies of access have simultaneously collected data on employment status together with data on residence location, provider location, and travel and waiting time to care (e.g., National Medical Expenditure Survey, National Health Interview Survey, and National Maternal and Infant Health Survey). However, these national studies do not provide a geographic reference (point location) for either workplace location or place of departure in

reporting travel time to care that would allow for the analysis of obstetrical care bypassing behavior at the individual level.

There are a large number of indirectly relevant articles that span several disciplines. The following discussion covers a wide range of disciplines and includes reviews of instructive research in: medicine, public health, demography, geography, business, economics, and sociology. These studies have been synthesized into five broad discussion categories which include: maternal employment, journey to work, distance to care, female health care utilization, and consumer choice. This latter classification serves to organize the review.

Maternal employment and reproductive risk factors were evaluated in a recent study (Savitz, et al., 1990). This work noted demographic and behavioral trait advantages among employed versus unemployed females using national survey data. The study discussed possible influences associated with the "healthy worker" and "unhealthy pregnant worker" effects. It stands to reason that a certain baseline level of health is required to maintain a job, so that unhealthy women are selected out of the labor force. However, given the tendency of women with young children to leave the workforce, those who have had a spontaneous abortion, stillbirth or infertility associated with delayed childbearing may possibly contribute to a higher prevalence of high risk pregnancies among employed women because those women, who have been unable to successfully conceive, remain in the workforce. In fact, evidence of prior fetal deaths among working women was noted.

Employment status was found to be associated with utilization of prenatal care in a study of low-income, inner-city women such that employed women were higher utilizers of prenatal care (St. Clair et al., 1990); but the study did not investigate how this situational barrier effected access among these women or control for different workloads among full- and part-time workers. Maternal employment as a risk factor for low birth weight (LBW) was found to be related to work characteristics—specifically an increased risk was observed for mothers who worked 40 or more hours per week (Peoples-Sheps et al., 1991). However, Herold and Waldron (1985) reported that part-time female workers tended to have poorer health than did full-time workers.

Journey to work has been shown to differ between men and women such that women typically commute shorter distances from home to work (Ericksen, 1977; Madden, 1981). The importance of occupation as an explanatory variable for predicting distance traveled to work was noted by Hanson and Johnston (1985). Giuliano (1988) discussed the significant dimensions of occupation, residential location, and journey to work in explaining gender-based segregation in economic activity. These dimension were also observed by England (1993) in her study of the spatial entrapment of employed women in suburban areas. This would suggest that women's reluctance to travel long distances limits their employment opportunities. The relative location of workplace in relation to residence and sorting out differential distance segment patterns is an important aspect of the geographic component of this line of research. The relationship between residential and workplace location and mode of transportation to work were evaluated by Rutherford & Wekerle (1988) and White (1977), suggesting useful factors to include in future research. A recent study by Johnston-Anumonwo (1992) assessed the influence of household type on gender differences in work trip distance. This study of Baltimore residents supported the "household responsibility hypothesis," which essentially states that the number of workers present in the home, marital status, and the presence of children are important in explaining shorter work trip distances for female workers. While work-trip distances have been linked to employment, they have not been empirically considered in conjunction with obstetrical health care behavior.

Distance to care is an important concept in health care research. The theoretical basis for considering distance to care comes from the geographic literature which suggests that consumers will tend to use those services located nearest to them. The concept of spatial interaction refers to the movement process demonstrated by the flows of goods and services and people over space while the principle of least effort generally accounts for the length and intensity of this movement. This principle is based on the notion that one minimizes distance and selects the shortest path when moving between two points. Underlying this principle is the idea of friction of distance, which refers to the resistance to movement over space. This principle has been used to demonstrate

distance decay for medical services, whereby patients are willing to travel different distances for varying levels of service (Gesler & Cromartie, 1985).

Hospital service areas are commonly constructed using a defined radius (e.g., 15 miles) or distance from the facility that includes the population whose residences fall within a specified boundary (e.g., 35 miles). Patient origin data based on the residences of those patients who have sought care at a particular facility is also used to define service areas. It should be pointed out that both of these approaches traditionally use patient residence as a point of reference (Morrill & Earickson, 1966; Garnick et al., 1987; Morrisey et al., 1988; Wright, 1990; Bronstein & Morrisey, 1991; and Nesbitt et al., 1993). For obstetrics, one team of researchers stated that they were "aware of no published report that describes a valid and reliable method of defining obstetric service areas;" they chose to use ZIP codes within 15 miles of a hospital for their case study of its closure and the effects on access (Taylor, Zweig, Williamson, Lawhorn & Wright, 1989).

Distance to care is known to be a barrier to access (Joseph & Phillips, 1984). Examination of the role of distance in explaining utilization patterns has been quite extensive but measures of distance have often been crude or proxy variables have been used as a result of data requirements and/or technology limitations. The early literature on travel time and distance to care is reviewed by Shannon et al. (1969). Defining the appropriate measure of distance is often the underlying issue with respect to data availability and scale of analysis. Joseph and Phillips listed the various measures of distance—travel time, linear distance, road mileage, and perceived distance—and expanded the notion of geographic accessibility to include locational (physical proximity) and effective accessibility (whether a facility is always available or open and whether a person's time-space budget permits her/him to use the service). Access is quite malleable to analyses using geographic techniques because of the relative importance of geography in terms of distance to care. This was an important extension that linked the relationship of geographic issues associated with distance to care to the broader array of identified factors influencing health care accessibility.

In discussing the concept of accessibility, Aday and Andersen (1974) differentiate between socio-organizational and geographic access; geographic accessibility "refers to the 'friction of

space' that is a function of the time and physical distance that must be traversed to get care and socio-organizational attributes include all those attributes of the resources, other than spatial attributes, that either facilitate or hinder the efforts of the client to obtain care." Chamberlain (1993) suggested that "...work may intrude on antenatal care" given that "...now the sophisticated antenatal clinic occupies more of the pregnant woman's time," with the result that both geographic and effective accessibility are potentially limited by maternal employment.

While a number of studies measured distances between residence and provider as the basis for their research including: Morrill and Earickson (1968); Shannon et al. (1979), Morrill, Earickson and Rees (1973); Mayer (1983), Williams et al. (1983) and Nesbitt et al. (1993), the only study to directly examine the issue of travel time and distance for obstetrics care was done by McGuirk and Porell (1984). While they did not control for employment status (part- vs. full-time) and used residence as a referent point in distance calculations, they did find the OB-GYN inpatient, hospital trips at shorter distances appeared "to be less sensitive to access differentials than are all other service categories" ...and "suggests that OB-GYN trips will be more strongly biased toward closer hospitals than other services." Bronstein and Morrisey (1991) noted that "...as women are forced to travel farther for obstetrics services, use of prenatal care will diminish and, consequently the outcomes for infants will deteriorate." Women have been reported to travel longer distances for obstetrical care, bypassing closer alternatives that are nearer to their homes (Bronstein & Morrisey, 1990 &1991; and the Wyoming Division of Health and Medical Services, 1989; Reed et al., 1994). These findings may be misleading in implying that distance is not as important for decisions about obstetrical care to the extent that they neglected to consider workplace location among the respective populations in explaining county outmigration patterns. A review of the distance to care literature, nevertheless, does not address the relative role of workplace location in assessing obstetrical health care behavior. The gap in this literature is the omission of workplace location in evaluating health care utilization for any service—obstetrical care, in particular.

Literature addressing female health care utilization suggests the need to consider the multiple roles juggled by such a rapidly increasing proportion of our labor force—working women

(Sorensen & Verbrugge, 1987; Muller, 1986; and Pleck, 1975). Muller (1977) points out the importance of incorporating "...patient time as an input into health care that is conditioned by a women's labor force participation," which addresses the opportunity costs associated with taking time to seek obstetrical care given a woman's conflicting role demands. While women have been shown to demonstrate a higher degree of health concern than men (Hibbard & Pope, 1987; Hulka & Wheat, 1985), gender differences in the adoption of the sick role were undetected (Hibbard & Pope, 1983). Chamberlain (1993) observed that home work, disproportionately borne by the woman of the home, could be both stressful and heavy, noting that its effect "must be added to that of paid work..." in assessing antenatal health care behavior. The importance of multiple roles and responsibilities of female workers that further limit their available time for health care, acting as psychological and sociological barriers to care (Augustyn & Maiman, 1994), are critical variables that should be addressed in future modeling attempts to explain these behavioral tendencies. We suggest that the Johnston-Anumonwo (1992) "household responsibility hypothesis" be adapted into an index format to control for these factors in attempts to mathematically model this concept. Directly related to this are the attitudes and perceptions of women that influence their health care behavior (Kalmuss & Fennelly, 1990.)

The only studies of maternal employment and health care utilization found in the literature looked at pediatric care among children of employed and unemployed women. Alexander et al. (1986) found that children of working mothers made fewer visits to the clinic than did children of housewives. Travel times and/or distances as well as transportation availability were not considered for this urban population. Maternal stress and the presence of social support were found to be important intervening variables. Low levels of stress and the presence of social support positively influenced the use of pediatric care by employed women for their children. This study is important in that it demonstrates differential use of health care services among women employed in paying jobs outside the home. However, it does not represent a general population nor does it account for important factors that have been shown to influence health care utilization in the general population. A more recent study by McCue Horwitz et al. (1993) attempted to explain

differences in maternal care practices in families with small children administered prior to pediatric visits for minor acute illnesses among employed and unemployed women. They found that unemployed women and those less satisfied with pediatric care were more likely to administer care at home prior to a pediatric visit than were employed women or those who were satisfied with the care administered by their providers after controlling for acuteness of illness. Job flexibility was also controlled for by using hours worked per week as a proxy variable. Also, the immunization levels of children employed by a large corporation were assessed by Fielding et al. (1994), using a mail survey. Low immunization rates were observed for children of workers, all of whom had insurance coverage for immunization. Their findings indicate that "initial immunization delay, work barriers (inability to get off work), and provider barriers (difficulty getting an appointment) remained important predictors of immunization status at age 2 years in multivariate analyses." While none of these studies directly examines obstetrical health care seeking behavior, they do demonstrate the significance of employment status of mothers on health care seeking behavior for pediatric care.

Studies of consumer choice for health care services largely address sociodemographic factors that are predictive of health care seeking behavior (Hansell, 1991; Sheps, 1985; Cohen and Lee, 1985; Kim, 1990; Litman, 1974; and Kirscht et al., 1976). Identified variables include but are not are not limited to race, education, income, family size, health status, and occupation. Hulka and Wheat (1985) point out "...the importance of measuring need (health status) adequately and with priority in one's analytic model to avoid spurious results." Provider choice for obstetrical care in an economic demand model would argue that choice of provider and extent of utilization is dependent on prices, income, and consumer preferences. This simple formulation does not identify the price components of money and time nor does it address the observation that the money component approaches zero as insurance covers a greater share of expenses (Acton, 1976). Coffey (1983) found that time-price had a small effect on the decision to seek ambulatory medical care among low-income women in Dallas, Texas; however, it had a major effect on the decision of which provider to visit. Similarly, selection of prenatal care provider was shown by Kelley et al. (1990)

to be influenced by convenience factors—in particular travel time, job demands, and child care. It should also be noted that certain opportunity costs influence obstetrical health care seeking behavior whereby a woman chooses among a variety of opportunities to spend her limited available time. By devoting time to medical encounters, a woman foregoes opportunities to work, care for children, enjoy leisure/recreation time, shop, etc. Furthermore, availability of providers as a resource limits consumer choice. Availability of obstetrical care resources can be thought of as enabling factors using the Andersen & Aday terminology (1974). The extent to which a woman's activity space, in terms of time spent in certain areas, is a function of her workplace location, provider choice may be limited. In other words, the appropriate referent point to examine in understanding health care seeking behavior among working women may well be her workplace rather than her home because the majority of her time is spent there.

Rurality and Use of Obstetrical Services

An association between diminished rural access to obstetrical care and poorer perinatal outcomes for women traveling outside their local communities for that care was reported by Nesbitt et al. (1990). The risk of receiving inadequate prenatal and maternal care was also noted by Lawhorne, Zweig, and Tinker (1990). Several studies of rural obstetrical care utilization have focused on county outmigration patterns in terms of its determinants (Bronstein & Morrissey, 1990, 1991) and negative consequences (Nesbitt et al., 1993; Reed et al., 1994). The likelihood of receiving adequate prenatal care, controlling for service need, was found for younger, less educated, low income, and rural women as well as those with longer travel times (McDonald & Coburn, 1988). While unequal distribution of resources together with racial and financial barriers to maternal and infant health services are similarly found among central city and rural residents (Hughes & Rosenbaum, 1989), these problems are exacerbated for rural women who are faced with the physical isolation of their rural existence. In their study of rural travel for primary care Shannon et al. (1979) point out "...considerable differences in travel preferences for a cross section of a rural population, an observation which discredits the assumption of population homogeneity used in most models." Joseph and Poyner (1982) set out to formulate a conceptual model that would explain

public service utilization among rural residents for library, medical, and dental services in Canada. They found that utilization was related more to consumer characteristics than to locational factors. Nevertheless, the strong relationship between "action space" and the utilization of local facilities is noted. (Action space is the limited geographic areas within which individuals typically live, work, and shop. It can also be thought of as an activity space.) To the extent that their residence location and jobs define their action spaces, rural women seem to be particularly vulnerable to in the influence of employment on health care seeking behavior in that they "...are more likely to be concentrated among the lower-paying, lower-status occupational categories" (Bescher-Donnelly & Smith, 1981). These types of jobs tend to have less flexibility in terms of taking time off from work.

Modeling the Dimensions of Potential Influence

The choice of provider is obviously limited by virtue of maternal employment because women are often working during those hours that obstetrical health care providers are operating. This choice is further complicated by a variety of intervening factors, which have been either identified in the literature or hypothesized by inference from relevant studies. The choice of provider may be limited by virtue of maternal employment because women are often working during those hours that obstetrical health care providers are operating. Evaluating the extent to which bypassing care is related to maternal employment is quite suitable to analyses using geographic techniques because of the relative importance of geography in terms of distance to care. Bypassing behavior is further complicated by a variety of potential covariates, which have been either identified in the literature or hypothesized by inference from relevant studies as being possible confounders or effect modifiers. These are listed together with the primary literature sources in Table 2.

Table 2

Potential Confounders and Effect Modifiers

Bypassing Care Closest to Home = *f* (Maternal Employment)

Subject to:	Primary Source(s):
Travel Time to Care	McDonald & Coburn, 1988
	Kelley et al., 1990
Distance to Care	Joseph & Phillips, 1984
	Aday & Andersen, 1974
	Eichhorn & Aday, 1972
Transportation Availability	Aday, Andersen & Fleming, 1980
Maternal Age	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
Maternal Race	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
Education	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
	Cooney, 1985
Family Income	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
Rural-Urban Residence Status	McDonald & Coburn, 1988
Household Responsibility	Johnston-Anumonwo, 1992
	Augustyn & Maiman, 1994
Risk Status of Mother	Hulka & Wheat, 1985
Gravidity	Johnston-Anumonwo, 1992
	Moss & Carver, 1993

Table 2 (continued)

Potential Confounders and Effect Modifiers

Bypassing Care Closest to Home = *f* (Maternal Employment)

Subject to:	Primary Source(s):
Medicaid/Insurance Coverage	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
	Cooney, 1985
	Bronstein & Morrissey, 1990, 1991
Job Flexibility	Fielding, 1994
Previous Use of Facility	Hulka & Wheat, 1985
Visit Time	Eichhorn & Aday, 1972
	Kalmuss & Fennelly, 1990
	Chamberlain, 1993
Convenience of Care	Aday, Andersen & Fleming, 1980
Reported Problems Getting Care	Kalmuss & Fennelly, 1990
Importance of Convenience of Workplace to Care	Darian, 1975

Secondarily, the relationship between maternal employment and adequacy of care should be evaluated. The degree to which maternal employment acts as a barrier to prenatal care has a great potential for influencing outcomes since more than half of child-bearing aged women participated in the labor force in 1992 (US Bureau of the Census, 1993). Eighty percent of these working women are expected to become pregnant at some point during their working lives, and 50 percent are expected to return to the workplace in the first year following delivery (NC Equity, 1991). As with bypassing care, a number of covariates may potentially affect the initiation of and compliance with prenatal care, which are both hypothesized by inference from relevant studies

and taken directly from the literature. Again, several personal attributes relevant to the obstetrical care behavior are also related to women's jobs. These are listed together with the primary literature sources in Table 3.

Table 3

Potential Confounders and Effect Modifiers
Adequacy of Care = *f* (Maternal Employment)

Subject to:	Primary Source(s):
Travel Time	McDonald & Coburn, 1988
	Kelley et al., 1990
Distance to Care	Joseph & Phillips, 1984
	Aday & Andersen, 1974
	Eichhorn & Aday, 1972
Maternal Race	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
Education	Aday, Andersen & Fleming, 1980
	McDonald & Coburn, 1988
	Cooney, 1985
Rural-Urban Residence Status	McDonald & Coburn, 1988
Household Responsibility	Johnston-Anumonwo, 1992
	Augustyn & Maiman, 1994
Risk Status of Mother	Hulka & Wheat, 1985
Gravidity	Johnston-Anumonwo, 1992
	Moss & Carver, 1993

Table 3 (continued)

Potential Confounders and Effect Modifiers
Adequacy of Care = *f* (Maternal Employment)

Subject to:	Primary Source(s):
Medicaid Coverage	McDonald & Coburn, 1988
	Cooney, 1985
Job Flexibility	Fielding, 1994
Convenience of Care	Aday, Andersen & Fleming, 1980
Transportation Availability	Aday, Andersen & Fleming, 1980

In comparing Tables 2 and 3, certain job characteristics and personal attributes are postulated to be relevant to both bypassing care (provider choice) and adequacy of care: job flexibility, demographics, transportation availability, distance to care, attitudes/preferences, and level of household responsibility. This observed overlap creates a situation whereby it becomes difficult to ignore adequacy of care issues when attempting to independently examine the basic aspects of the relationship between maternal employment on obstetrical health care seeking behavior. So many of these variables that potentially influence one relationship are also implicated in the other. It begs the question—Are employed women at greater risk for receiving inadequate care? For this reason, we suggest that both the focal relationship, which is the extent to which bypassing care closest to home is influenced by maternal employment, as well as the secondary relationship that focuses on the extent to which adequacy of care is influenced by maternal employment be evaluated. The final section discusses our proposed agenda for research by stating research question and corresponding hypotheses that have emerged from the previously presented materials.

Proposed Agenda for Research

Research Questions

The fact that there are large increases in the participation rates of childbearing-aged females in the workforce calls for re-evaluation of a basic assumption, which is consistently made in obstetrical health care delivery planning; that is, residence location is no longer the only relevant referent point in examining provider choice and distance to care. The following research questions arise from a re-evaluation of provider choice and bypassing behavior:

(1) To what extent is obstetrical care bypassing behavior influenced by maternal employment?

- (1a) To what extent is the propensity to bypass the nearest provider to their workplaces influeced by job flexibility among working women?
- (1b) Does distance to care influence the relationship between maternal mployment and obstetrical care bypassing behavior?
- (1c) Are subgroups differentially effected (e.g., urban/rural residence, race, insurance status)?

Employment during pregnancy may also influence the time that prenatal care is initiated and a woman's subsequent compliance with recommended visit schedules given the extent to which they are vulnerable to financial penalties (e.g., required sick leave that she may have been reserving for after the delivery and/or time off without pay), inflexible work schedules, and other household responsibilities. The relevant research question question with repect to these issues is:

(2) To what extent is adequacy of care influenced by maternal employment?

Despite the demonstrated need for studies to answer these research questions, no previously conducted or ongoing research studies that directly assess the influence of workplace location on health care seeking behavior for obstetrical care have been identified. It may be most useful and efficient to target early research efforts at particularly vulnerable population subgroups, who are most likely to be directly susceptible to distance/travel pattern influences in their health care seeking behavior.

Testable Hypotheses

The following hypotheses, which are stated in terms of the null, have been developed from the research questions specified in the preceding section. In doing so, a clear hierarchy has been established to reflect the focus of future research efforts.

The primary hypothesis suggested for future investigation can be stated as:

H1: ***Employed women and unemployed women are equally likely to bypass those obstetrical care providers located closest to their homes.***

Hypothesis 1 could be tested with an adjusted odds ratio (controlling for identified confounders and effect modifiers) that compares the odds of bypassing providers closest to home among employed women to the odds of bypassing care closest to home among unemployed. We anticipate that employed women are more likely than unemployed women to bypass providers located closest to their homes. Three related sub-hypotheses are:

H1a: ***Job flexibility does not differentially affect the ability of employed women to bypass care located closest to their workplaces.***

Again an adjusted odds ratio could be used to detect the relationship of job flexibility and bypassing care located closest to workplace, comparing the odds of bypassing providers located closest to work among employed women with flexible jobs to the odds of bypassing providers closest to work among employed women with inflexible jobs. It is anticipated that women with low/no job flexibility are less likely to bypass care closest to their workplaces.

H1b: ***Distance to care does not influence the relationship between maternal employment and bypassing care located closest to home.***

To test distance to care (from home to provider) as an effect modifier on the primary relationship of interest—maternal employment and bypassing care located closest to home—an interaction term could be used to assess whether the relationship between employment and bypassing providers located closest to home differs as a function of distance to care. We anticipat that distance to care

will be found to directly influence this relationship such that the relationship between employment and bypassing care closest to home will be more pronounced as a function of greater distance to care.

H1c: No groups (as defined by race, urban/rural residence, income, education, and insurance) are differentially affected in terms of maternal employment and bypassing the closest provider to home.

Again, Hypothesis H1c tests for effect modifiers of the primary, Hypothesis 1 as was the case for Hypothesis H1b. We anticipate that the relationship between maternal employment and bypassing care closest to home will be less pronounced among urban, higher income, more highly educated, women.

The secondary hypothesis suggested for future evaluations of this issue can be specified as:

H2: Adequacy of care does not differ between employed and unemployed women.

This hypothesis could also be tested using an adjusted odds ratio (again controlling for identified confounders), comparing the odds of obtaining adequate prenatal care among employment women versus the odds of obtaining adequate prenatal care among unemployed women. We anticipate that employed women are more likely to receive adequate prenatal care than are unemployed women because of their increased activity spaces[1], which increases the number of available providers, as well as the increased likelihood that they have insurance coverage. The relationships developed here are next used to generate indications for future study and potential policy indications of future research findings.

A Vulnerable Study Population for Future Investigation

Most apparent from this discussion is that employed, rural women are particularly vulnerable because of the relative importance of their geographic remoteness, diminishing

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[1] The area defined by where a person normally lives, works, and shops.

provider availability, and higher risk of poor birth outcome. A recent March of Dimes report (1991) noted that "the problem of infant mortality in rural areas rivals that of urban areas "such that the needs of mothers and babies in rural America are being overlooked." As previously noted, Lawhorne et al. (1990) demonstrated through their review of the literature during the 1980s that "rural America is at risk for receiving inadequate prenatal and maternal care."

Employed, rural women are particularly at risk to the extent that they often travel longer distances to work than are urban or suburban women because of limited employment opportunities in rural areas (Bescher-Donnelly & Smith, 1981). They have been shown to be at risk for traveling longer distances to care as a result of the decreasing availability of obstetrical care providers in their local communities (Gordon & Higgins, 1991). Bronstein & Morrisey (1990) found that wealthier women and blacks tended to travel longer distances to inpatient obstetrical care, leaving their county of residence to seek obstetrical care. They speculated that higher income women sought care at larger hospitals for quality reasons and that race was acting as a surrogate for insurance coverage (i.e., Medicaid). It is logical to assume that employed women would have higher incomes than their unemployed counterparts such that income may have masked a direct association with maternal employment. Neither insurance coverage nor maternal employment were directly measured in this study.

Data Limitations

Several data limitations exist with respect to obstetrical care that should be used to guide future research efforts. While most states do not collect employment information on the birth certificate, ecological analyses are still limited in that workplace location is not collected for those states that do provide this information. Available secondary data sets such as the National Maternal and Infant Health Survey do not collect information on workplace or provider location that would allow for these relative distance calculations (workplace to provider, residence to workplace, and residence to provider). Also, potential biases exist for secondary data analyses with respect to variations in the comprehensiveness of prenatal care visit reporting (Peoples-

Sheps, Kalsbeek, & Siegel, 1988; Kotelchuck, 1987). An in-depth evaluation of this issue, therefore, requires a primary data collection effort, collecting data directly from women.

Potential Policy Implications

A better understanding of these dimensions of maternal employment, which affect such a large proportion of child-bearing women, could be used by physicians and hospitals to improve obstetrical health care delivery by improving the location of new clinics/facilities or justifying the use of mobile clinics that travel to remote workplace locations. Additionally, employers have begun to consider cost containment and labor force investment opportunities available through the initiation of worksite-based prenatal care and education programs. Some employers have even begun to develop strategies for encouraging early and regular prenatal care (Burton et al., 1991; Cecil G. Sheps Center for Health Services Research, 1993). Additionally, racial discrepancies in adequacy of care measures among white versus nonwhite populations persist despite numerous policy efforts to mitigate differential access to prenatal care. Inadequate prenatal care has been linked to poor birth outcomes. A wide gap continues to exist between white and nonwhite infant mortality rates in the US despite targeted programs to narrow the gap. Similarly, both rural and inner city women have been shown to experience higher infant mortality rates than the general population. Perhaps a better understanding of differential work conditions with respect to job flexibility and competing household demands may help to explain some part of health care behavior tendencies that lead to this poor birth outcome that would be useful in the development of social programs to make it easier for these women to initiate and comply with prenatal care. Whether planning for the delivery of obstetrical care or determining how to contain obstetrical care costs, increased knowledge of the potential influence of maternal employment in terms of provider choice, bypassing behavior, and initiation of and/or compliance with prenatal care may serve to improve access and health status.

References

Access to Health Care: Key Indictors for Health Policy. Waltham, MA and Princeton, NJ: Center for Health Economics Research and The Robert Wood Johnson Foundation, November 1993

Acton, J. P.: "Effects of Health Insurance on the Market for Health Services," in Rosett, R. N. (Editor), **The Role of Insurance in the Health Services Sector**, NY:Neale Watson Academic Publications of the National Bureau of Economic Research, 1976.

Aday, Lu Ann and Ronald Andersen: "A Framework for the Study of Access to Medical Care," **Health Services Research**, 9:208-220, 1974.

Alexander, Cheryl S. and Ricka Markowitz: "Maternal Employment and Use of Pediatric Clinic Services," **Medical Care**, 24(2):134-147, 1986.

Anderson, Cathy: Personal communication with the Director of Planning for Kaiser's Rocky Mountain Regional Office, 1992.

Augustyn, Marycatherine and Lois A. Maiman: "Psychological and Sociological Barriers to Prenatal Care, **Women's Health Issues**, 4(1):20-28, 1994.

Berscher-Donnelly, Linda and Leslie Whitener Smith: "The Changing Roles and Status of Rural Women," Chapter 9 in **The Family in Rural Society**, Raymond T. Coward and William M. Smith, Jr. (editors), Boulder, CO: Westview Press, 1981.

Bronstein, Janet M. and Michael A. Morrisey: "Determinants of Rural Travel Distance for Obstetrics Care," **Medical Care**, 28(9):853-865, 1990.

Bronstein, Janet M. and Michael A. Morrisey: "Bypassing Rural Hospitals for Obstetrics Care," **Journal of Health, Policy, and Law**, 16(1):87-120, 1991.

Burton, Wayne N., Denise Erickson, and Jorgia Briones: "Women's Health Programs at the Workplace," **Journal of Occupational Medicine**, 33(3):349-50, 1991.

Cecil G. Sheps Center for Health Services Research: "Study of Health Insurance Coverage for Prenatal and Delivery Services in North Carolina," final report prepared for the North Carolina General Assembly under contract with the NC Department of Insurance, March, 1993.

Chamberlain, Geoffrey V.: "Work in Pregnancy," **American Journal of Industrial Medicine**, 223:559-575, 1993.

Coffey, R. M.: "The Effect of Time Price on the Demand for Medical Care Services," **Journal of Human Resources**," 18:407, 1983.

Cohen, Morris A. and Hau L. Lee: "The Determinants of Spatial Distribution of Hospital Utilization in a Region," **Medical Care**, 23(1):27-38, 1985.

England, Kim V. L.: "Suburban Pink Collar Ghettos: The Spatial Entrapment of Women?," **Annals of the Association of American Geographers**, 83(2):225-242, 1993.

Ericksen, Julia A.: "An Analysis of the Journey to Work for Women," **Social Problems**, 24:428-35, 1977.

Fielding, Jonathan E., William G. Cumberland, and Lynn Pettitt: "Immunization Status of

Children of Employees in a Large Corporation," **JAMA**, 271(7):525-530, 1994.

Garnick, Deborah W. et al.: "Appropriate Measures of Hospital Market Areas," **Health Services Research**, 22(1):69-89, 1987.

Gesler, W. M. and J. Cromartie: "Studying Spatial Patterns of Illness and Hospital Use in a Central Harlem Health District," **Journal of Geography**, Volume 84, 1985.

Gesler, Wilbert M. and Melinda S. Meade: "Locational and Population Factors in Health-Care Seeking Behavior in Savannah, Georgia, **Health Services Research**, 23(3):443-62, 1988.

Gordon, Rena J. and Brad A. Higgins: "Declining Availability of Physician Obstetric Service in Rural Arizona and Medical Malpractice Issues," presented at the American Association of Geographers Meeting, April, 1991.

Giuliano, Genevieve: "Commentary: Women and Employment," **Urban Geography**, 9(2):203-208, 1988.

Hansell, Mary Jo: "Sociodemographic Factors and the Quality of Prenatal Care," **American Journal of Public Health**, 81(8):1023-1028, 1991.

Hanson, Susan and Ibipo Johnston: "Gender Differences in Work-Trip Length: Explanations and Implications," **Urban Geography**, 6(3):193-219, 1985.

Herold, Joan and Ingrid Waldron: "Part-Time Employment and Women's Health," **Journal of Occupational Medicine**, 27(6):405-412, 1985.

Hibbard, Judith H. and Clyde R. Pope: "Gender Roles, Illness Behavior and Use of Medical Services," **Social Science & Medicine**, 17(3):129-137, 1983.

Hibbard, Judith H., and Clyde R. Pope: "Employment Status, Employment Characteristics, and Women's Health," **Women & Health**, 10(1):59-77, 1985.

Hibbard, Judith H. and Clyde R. Pope: "Employment Characteristics and Health Status Among Men and Women," **Women & Health**, 12(2):85-102, 1987.

Hughes, Dana and Sara Rosenbaum: "An Overview of Maternal and Infant Health Services in Rural America," **Journal of Rural Health**, 5(4):299-342, 1989.

Hulka, Barbara S. and John R. Wheat: "Patterns of Utilization, The Patient Perspective," **Medical Care**, 23(5):438-460, 1985.

Johnston-Anumonwo, Ibipo: "The Influence of Household Type on Gender Differences in Work Trip Distance," **Professional Geographer**, 44(2):161-69, 1992.

Joseph, Alun E. and David R. Phillips: "Access to Health Care," Chapter 3 in **Accessibility and Utilization, Geographical Perspectives on Health Care Delivery**, NY: Harper & Row Publishers, 1984.

Joseph, Alun E. and Alison Poyner: "Interpreting Patterns of Public Service Utilization in Rural Areas," **Economic Geography**, 58:252-273, 1982.

Kalmuss, Debra and Katherine Fennelly: "Barriers to Prenatal Care Among Low-Income Women in New York City," **Family Planning Perspectives**, 22(5):215-231, 1990.

Kelley, Michele A., Janet D. Perloff, Naomi M. Morris, and Wangyue Liu: "The Role of Perceived Barriers in the Use of a Comprehensive Prenatal Care Program," presented at the Annual Meeting of the American Public Health Association, New York, October 1, 1990.

Kim, Byung-Ryang: "A Logit Analysis of Hospital Choice Behavior in Chollabukdo Province of Korea," **Social Science and Medicine**, 30(10):1119-1129, 1990.

Kirscht, John P., Marshall H. Becker and John P. Eveland: "Psychological and Social Factors as Predictors of Medical Behavior," **Medical Care**, XIV(5):422-431, 1976.

Kotelchuck, Milton: "The Mis-measurement of Prenatal Care Adequacy in the US and a Proposed Alternative Two-part Index," presented at the APHA Annual Meeting, 1987.

Lawhorne, Larry, Steven Zweig, and Hope Tinker: "Children and Pregnant Women," **Journal of Rural Health**, 6(4):365-377, 1990.

Lehrer, Evelyn and Marc Nerlove: "Female Labor Force Behavior and Fertility in the United States," **Annual Review of Sociology**, 12:181-204, 1986.

Litman, Theodore J.: "The Family as the Basic Unit in Health and Medical Care: A Social Behavioral Overview," **Social Science & Medicine**, 8:495-519, 1974.

Madden, Janice Fanning: "Why Women Work Closer to Home," **Urban Studies**, 18:181-194, 1981.

March of Dimes Birth Defects Foundation: "Infant Survival in Rural America,," report release dated August 5, 1991.

Mayer, Jonathan D.: "The Distance Behavior of Hospital Patients: A Disaggregated Analysis," **Social Science & Medicine**, 17(12):819-827, 1983.

Mazey, Mary Ellen and David R. Lee: **Her Space, Her Place. A Geography of Women**, State College, PA: Commercial Printing, Inc. by the Association of American Geographers, 1983.

McCue Horwitz, Sarah, Ralph I. Horwitz, and Hal Morgenstern: "Maternal Employment, Maternal Care and Pediatric Visits for Minor Acute Illnesses," **Journal of Clinical Epidemiology**, 46(9):981-986, 1993.

McDonald, Thomas P. and Andrew F. Coburn: "Predictors of Prenatal Care Utilization," **Social Science & Medicine**, 27(2):167-172, 1988.

McGuirk, Margorie A. and Frank W. Porell: "Spatial Patterns of Hospital Utilization: The Impact of Distance and Time," **Inquiry**, 21:84-95, 1984.

Meade, Melinda, John Florin, and Wilbert Gesler. **Medical Geography**. New York: The Guilford Press, 1988.

Millman, Michael, (Editor): **Access to Health Care in America**, Washington, D.C., 1993

Moore, Emily C. (Editor): "Women and Health in the United States, 1980," supplement, **Public Health Reports**, September-October, 1980.

Morrill, Richard and Robert Earickson: "Hospital Service Areas: Distance of Hospital from Patient Home," Working Paper #I.5, Chicago Regional Hospital Study, December, 1966.

Morrill, Richard L. and R. J. Earickson: "Variation in the Character and Use of Chicago Area Hospitals," **Health Services Research**, 3(2):224-38, 1968.

Morrill, Richard L., Robert J. Earickson, and Philip Rees: "Factors Influencing Distances Traveled to Hospitals," **Economic Geography**, 46(2):161-171, 1973.

Morrisey, Michael A., Frank A. Sloan, and Joseph Valvona: "Defining Geographic Markets for Hospital Care," **Law and Contemporary Problems**, 51(2):165-194, 1989.

Muller, Charlotte: "Health and Health Care of Employed Women and Homemakers: Family Factors," **Women & Health**, 11(1):7-45, 1986.

Muller, Charlotte: "Methodological Issues in Health Economics Research Relevant to Women," **Social Science & Medicine**, 11:819-825, 1977.

Nesbitt, Thomas S, Frederick A. Connell et al.: "Access to Obstetric Care in Rural Areas: Effect on Birth Outcomes," **AJPH**, 80(7):814-818, 1990.

Nesbitt, Thomas S., Eric H. Larson, Roger A. Rosenblatt, and L. Gary Hart: "Local Access to Obstetric Care in Rural Areas: Effect on Prenatal Care, Birth Outcomes, and Costs," WAMI working paper, August, 1993.

NC Equity: **What Is a Woman Worth? North Carolina Women, Families & the Economy in Transition**, Raleigh, North Carolina by TwoMorrow Advertising and Design, 1991.

Peoples-Sheps, Mary D., William D. Kalsbeek, and Earl Siegel: "Why We Know So Little About Prenatal Care Nationwide: An Assessment of Required Methodology," **Health Services Research**, 23(3):359-380, 1988.

Peoples-Sheps, Mary D., et al.: "Characteristics of Maternal Employment during Pregnancy: Effects on Low Birthweight," **AJPH**, 81(8):1007-1012, 1991.

Pleck, Joseph H.: "The Work-Family Role System," paper presented at the Annual Meeting of the American Sociological Association, 1975.

Reed, Fred W., William H. McBroom, Terry D. Berkhouse, et al.: "Trips for Birthing: Inequality in Access to Medical Resources in Montana, 1980-1989," presentation at the Annual meetings of the Pacific Sociological Association, San Diego, CA, April, 1994.

Rosenblatt, Roger A.: "Commentary, The Perinatal Paradox: Doing More and Accomplishing Less," **Health Affairs**, pages 158-168, Fall, 1989.

Rutherford, Brent M. and Gerda R. Wekerle: "Captive Rider, Captive Labor: Spatial Constraints and Women's Employment," **Urban Geography**, 9(2):116-137, 1988.

St. Clair, Patricia A., Vincent L. Smeriglio, Cheryl S. Alexander, Frederick A. Connell, and Jennifer R. Neibyl: "Situational and Financial Barriers to Prenatal Care in a Sample of Low-Income, Inner-City Women," **Public Health Reports**, 105(3):264-267. 1990.

Savitz, David A., Elizabeth A. Whelan, et al.: "Maternal Employment and Reproductive Risk Factors," **American Journal of Epidemiology**, 132(5):933-945, 1990.

Shannon, Gary W., Rashid L. Bashur, and Charles A. Metzner: "The Concept of Distance as a

Factor in Accessibility and Utilization of Health Care," **Medical Care Review**, 26(2):143-61, 1969.

Shannon, Gary, Joseph Lovett, and Rashid Bashshur: "Travel for Primary Care: Expectation and Performance in a Rural Setting," **Journal of Community Health**, 5(2):113-125, 1979.

Sheps, Cecil G.: "Reconsidering the 'Market Model' in Obstetrics. Part II," **Birth**, 12(1):37-39, 1985.

Shortell, Stephen M., and Uwe E. Reinhardt: **Improving Health Policy and Management: Nine Critical Issues for the 1990s**, Ann Arbor, MI: Health Administration Press, 1992.

Sorensen, Gloria and Lois M. Verbrugge: "Women, Work, and Health," **Annual Reviews in Public Health**, 8:235-51, 1987.

Taylor, Jane, Steven Zweig, Harold Williamson, Larry Lawhorne, and Harley Wright: "Loss of a Rural Hospital Obstetric Unit: A Case Study," **Journal of Rural Health**, 5(4):343-352, 1989.

US Bureau of the Census: **Statistical Abstract of the United States: 1991** (111th edition), Washington, DC, 1991.

US Bureau of the Census: Current Population Reports, Series P-23, No. 173, Population Profile of the United States: 1991, US Government Printing Office, Washington, DC, 1993.

US Congress, Office of Technology Assessment: **Health Care in Rural America**, OTA-H-434, Washington, DC: US Government Printing Office, 1990.

US National Center for Health Statistics. Vital Statistics of the United States. Volume 1, Natality, 1980-1989. Washington, DC: US Government Printing Office, 1990.

US National Center for Health Statistics. Monthly Vital Statistics Report. Volume 40, No. 8, 1991.

US National Center for Health Statistics. Monthly Vital Statistics Report, Volume 41, No. 9, 1993.

White, Michelle J.: "A Model of Residential Location-Choice and Commuting by Men and Women Workers," **Journal of Regional Science**, 17(1):41-52, 1977.

Williams, Albert, et al.: "How Many Miles to the Doctor?" **New England Journal of Medicine.**, 309:958-63, 1983.

Wright, George E.: "Alternative Hospital Market Area Definitions," Technical Report #E-90-02, SysteMetrics/McGraw-Hill, March, 1990.

Wyoming Health Care Data Authority: "Economic Effects of the Out-Migration of Obstetric Services in Uinta County, A Policy Report". Division of Health and Medical Services, 1989.