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A descriptive study of adolescent pregnancy and birth outcomes in Tarrant county, Texas between 1991 and 1995 was conducted to evaluate the effect of maternal age on infant birthweight and mortality among White, African American, and Hispanic adolescent mothers nineteen years old and younger. The age of the mother was not a significant predictor of infant birthweight and mortality, but mother's ethnicity, weight gain, and gestational age were found to be strong predictors of infant birthweight and mortality. The Hispanic ethnic group came out much better than White and Black mothers but no difference between White and Black mothers regarding birthweight was found. The results from the data analysis demonstrated that teenage pregnancy may not be a serious problem in Tarrant County, Texas as was previously thought.

A DESCRIPTIVE ANALYSIS OF ADOLESCENT PREGNANCY AND BIRTH OUTCOMES IN TARRANT COUNTY, TEXAS

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DEDICATION

TO my wife, Kathleen

And

Daughters, Christy and Stelah

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CHAPTER I

INTRODUCTION

Adolescent pregnancy has for a long time been a major societal concern. During the past decade, this issue has become one of the most frequently cited examples of the perceived societal decay in the United States because approximately one million teenagers become pregnant each year, and half that number give birth (Alan Guttmacher Institute, 1994, and United States House of Representatives, 1996).

For as long as we know, young women in their adolescent years have been bearing children. According to Vinoviskis (1988) and contrary to common opinion, adolescent marriage and childbearing was not the norm in American history. Estimates of the age of marriage for females in early America range from 20 to 25 years of age. The age of menarche ranges from 15 to 17 years depending on the area of the country and the time period in American history used to make the estimates. Current estimates of the mean age of

menarche are 12.8 years, which is thought to be due to nutritional improvements (Vinoviskis, 1988).

The low rate of premarital pregnancies in the 17th century was probably due to the Puritans' strong opposition to premarital and extramarital sex. During that time, communities, families, the civil magistrates, and ministers were all in concert regarding the impropriety of sex outside marriage. It was not until the 18th century when church leaders attempted to punish those departing from the moral standards of the day that they lost the support of the families in the community and disintegration of previous moral standards had already begun. Families were unable to induce their young to marry according to the parents' wishes and they were unable to deter premarital sexual activity.

Redefinition of appropriate sexual behavior among young people evolved during this time from marital sexual activity, to engaged or promised-to-marry sexual activity as the acceptable or appropriate limits of sexual behavior. The community or the family did not have to bear the burden of premarital pregnancies as the couple nearly always married and established their own household.

Adolescent pregnancy simply was not an issue of consequence during those times. However, beginning from the mid-1960s, the pregnant adolescent was no longer an invincible, nameless, faceless, moral deviant, but a single, pregnant, young woman in need of medical care. Now, adolescent pregnancy had become a social problem of enormous magnitude due to its medical/technical nature (Buchholtz and Goi, 1986).

Teen pregnancy has become very much a public debate in recent years, partly because of three social forces. First, child poverty rates are high and rising. Second, the number of welfare recipients and the concomitant cost of public assistance have risen dramatically. And third, among those on welfare, we see a much higher proportion of never-married women, younger women, and women who average long periods of dependency.

The social and economic consequences of the estimated one million pregnancies each year are substantial. In 1985 alone, about $16.6 billion in public funds was spent to support families began by teenage mothers (Healthy People 2000, 1993). Unintended births to adolescents, which accounts for about 40% of teenage pregnancies,

cost more than $1.3 billion in direct health care expenditures each year, while induced and spontaneous abortions among teenagers cost more than $180 million (Alan Guttmacher Institute, 1994 and Trussell et al., 1995).

Over several decades, the rate of births to female adolescents declined substantially between 1960 and 1985, falling from 89.1 births per 1000 teenagers ages 15 - 19 in 1960 to 51.0 in 1985. The late 1980s also saw a rate increase to a recent high of 62.1 in 1991, declining again in the 1990s to 56.8 births per 1000 of 15 - 19 year-olds in 1995 (US Dept. of Health and Human Services, 1995).

The majority of these births to teenagers are concentrated in the later years of adolescence and according to Rosenberg et al. (1996) and Ventura et al. (1997), the rates for 18-19 year-olds are more than double those for 15-17 year-olds while the rates for those under 15 years of age are too low to provide any meaningful statistical interpretations in most reports.

Babies who are born to teenagers are more likely than those born to women in their 20s to be born early, to weigh less than 2,500g at birth or to die before age one. Further research suggests that these

risks vary by age even among teenage mothers, with those younger than 15 having the worst outcomes (Hayes, 1987). Fraser and colleagues (1995) also concluded that babies born to teenagers younger than 17 faced an increased risk of low birth weight, even when the sample was limited to married teenagers who had received adequate prenatal care and had age-appropriate educational levels. Collectively, the evidence suggests that young teenagers face greater risk for adverse outcomes than older teenagers, and that at least some of this association is due to biological immaturity.

Some other studies have reported that birth outcomes are dramatically worse for Blacks than for Whites among all age-groups except the youngest teenagers, which suggest that race may be more important than maternal age in explaining outcomes (Massey and Kanaiupuni, 1992, Poledriak, 1996, and La Viest, 1993).

The results of most studies on the relationships among maternal age, birth outcomes, and infant mortality have left important gaps between various age groups on the reproductive spectrum. The aggregation has tended to mask important within-group differences at both ends of the reproductive age spectrum. For example, research

that groups teenagers at ages 13 or 14 through 17 may mask variation within this disparate category of adolescents (Fraser, Brocket, and Ward, 1995 and Strobino et al., 1996). However very few studies have examined the birth outcomes of a narrowly defined adolescent maternal age-groups to pregnancy outcomes. And therefore the objectives of this study are:

1. To assess the true effects of maternal age on birth outcomes in Tarrant County, Texas by narrowly defining age-groups spanning all adolescent reproductive ages across a number of outcomes.
2. To evaluate the racial/ethnic (minority) distribution of adolescent pregnancy by narrowly defining specific age-groups of all teen pregnancies in Tarrant County, Texas.
3. To analyze and characterize very low birthweight (VLBW), low birthweight (LBW), neonatal mortality, and post neonatal mortality, by race/ethnicity and specific age-groups for all teen reproductive ages in Tarrant County, Texas.

CHAPTER II

LITERATURE REVIEW

Adolescent Pregnancy

Adolescent pregnancy continues to be a critical problem that is facing families and society. It has a profound impact on the physical, psychosocial, and cognitive development of mother and infant. In the United States, more than 1 million young women, younger than 20 years (about 1 out of 10) become pregnant. Approximately 50% of these pregnant adolescents give birth, 30% to 40% have induced abortions, and the remainder has spontaneous abortions (Steven-Simon and White, 1991).

Miller (1974) categorized the three stages of adolescent psychosocial development as early, middle, and late adolescence, and each stage is about 3 years long. Mott (1990) and Johnson (1995) have confirmed the Miller's breakdown of adoloscent developmental stages as relevant and applicable to adolescents of the 1990s.

The early stage, which lasts from ages 11 to 15 years, is

characterized by turmoil stemming from physical changes, loss of body control, and hormonal influence on the emotions. Miller (1974) also reported that adolescents are aware of this restlessness and tension and unconsciously look for control. In an effort to exert some control, they show overt defiance of parents and other authority figures. At this stage, the adolescents have an intense preoccupation with their appearance. Middle adolescence, ages 14 to 18 years, focuses on self-identification and self-realization. During this period, they develop a sense of their own identity and begin to make choices about what they want to do with their lives. At this stage, girls are more interested in developing intense loving relationships with boys while boys are more interested in the pleasures of sexual activity than the maintenance of a loving relationship.

During the late adolescence, (ages 17 to 20 years), coping is the primary characteristic reported by Miller. The late adolescent is preoccupied with a chance to try on the identity confirmed in the middle adolescent stage and filled with a firm sense of self, begins to learn to cope with the complexities of adulthood (Miller, 1974).

An adolescent may be at one level of cognitive development and another level of psychosocial development because chronological age does not always correspond to maturity. It is for this reason that effective interaction with pregnant adolescents requires an understanding of their cognitive and psychosocial development. In addition, the achievement of developmental tasks become more complex when the adolescent becomes pregnant. Not only does the young woman face the usual development tasks of her stage of adolescence, but superimposed upon the pregnant adolescents are also developmental tasks of pregnancy (Johnson, 1995).

Adolescent pregnancy has been associated with increased health risks for the teen mother and her infant. The adolescent is 1.3 times more likely to suffer from nonfatal anemia or toxemia, as a result of the pregnancy or birth than older women while infants born to adolescent mothers are twice as likely to be premature and be of low birth weight than infants born to older mothers. These health complications are believed to result from postponed or nonexistent prenatal care, poor nutrition and other lifestyle factors. In addition, only 6 in 10 adolescent mothers will graduate from high school,

compared with 9 in 10 of their peers who delay parenthood (Lawson and Rhode, 1993). The incomplete education will have a long-term effect on the adolescent's employment future, bringing a lifetime of under-employment or unemployment, not to mention other diminished life options.

Many adolescent mothers are choosing not to marry, and the resultant increase in the number of single-parent families has contributed significantly to the increase in child poverty rates from 15% in 1960 to about 20.3% in 1988. Other studies have indicated that being born to a single-parent family also puts a child at risk for emotional, behavioral, and learning problems at school which in turn contributes to a cycle of poverty (Children's Defense Fund, 1989).

Apart from the high costs that are borne by the adolescent mother, the American taxpayer also pays a price for the high rate of early childbearing. In a study conducted in 1979 for the Population Resource Center, Burt (1990) estimated that a family begun by each first birth to a teenager in that year would eventually cost taxpayers $18,710 (in 1979 dollars). The same study estimated that all such families begun by first births to teenagers in 1979 would

eventually cost at least $8.3 billion (in 1979 dollars). Included in all public costs were Aid to Families with Dependent Children Funds (AFDC) also known as welfare, medical assistance, and other social services.

According to the Alan Guttmacher Institute (1993), adolescents who become mothers are disproportionately poor and dependent on public assistance. Aid to Families with Dependent Children (AFDC) is a federal funded program that provides income support to the custodial parent of dependent children. It began as a program to provide benefits to the children of widowed mothers but was expanded in 1950 to its current coverage. For most of its existence the AFDC has not been without controversies. It has generated a lot of criticisms for perpetuating these dysfunctional families that make up America's under class. By providing more benefits than those of minimum wage job, a working mother appears to be penalized (Alan Guttmacher Institute, 1993).

The perception among policy makers and the general public today, however, remains that the adolescent pregnancy and birth rates are still too high with the resulting consequences still too expensive.

Instead of focusing on an increase in the adolescent childbearing rates, policy makers responded to the effects of the legalization of abortion and separate social trends that were converging in the 1970s and 1980s. These trends include the growing acceptance of nonmarital sexuality and cohabitation and the increase in nonmarital birth rate among all women, but more specifically among adolescents (Rhode, 1993).

However, throughout the colonial America, adolescent sexuality, pregnancy, and childbearing were not a problem. The average age of puberty was 15 years or older. Up until the nineteenth century the American attitude toward early childbearing was largely permissive and intimacy was often permitted during courtship. There were however great fluctuations in rates of premarital sexual activity among both adolescents and adults and in rates of premarital pregnancy over time and between regions of the country. For example, an increase in rates at the end of the Eighteenth century was attributed to increased geographical mobility, the breakdown of stable communities during and after the American Revolution, and an increased legal tolerance for bastardy and fornication (Rhode, 1993).

The evolution of the United States economy over the decades to be technologically advanced, has also acquired a growing need for educated and technically competent workers. The lack of a high school education has become a serious barrier to economic future self-sufficiency, and teenage mothers and their infants face a much more uncertain economic future than was once thought. Additionally, "acquiring economic, social and technical independence in this environment requires an extensive training period for young people, thus prolonging the period of dependence on their families". The dependence has also often meant a reliance on AFDC by young, single mothers and their children.

The issue of welfare reliance has become intertwined with those of adolescent pregnancy, contraception, and abortion. And critics have claimed that young women have used the financial support of the AFDC to be able to move out of their parents homes and consequently avoid parental supervision (Rhode, 1993).

At the national level, the passage of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, has been hailed as an extraordinary event in United States social policy toward

impoverished children and their families, especially adolescent mothers and their offspring (United States House of Representatives, 1996). This unprecedented antipoverty legislation stems, in part from the long-standing concern on the part of the public and policy makers that the former welfare system caused families to rely on government cash aid rather than seek employment and become financially independent. However, it was the intersection of this concern regarding welfare dependency with reactions to high rates of nonmarital and adolescent childbearing that truly galvanized the support for the 1996 legislation.

The main provisions of the bill that are likely to have a greater impact on young mothers are: (a) entitlement to cash welfare benefits is abolished; (b) families can receive benefits for no longer than five years over their lifetimes (shorter at state discretion, longer if states use their own funds); (c) recipients are required to work 20-30 hours per week after two years of receiving support; (d) minor mothers are required to live with a parent or a legal guardian and to stay in school; and (e) mothers are required to identify the fathers of their children and to cooperate with child support

enforcement. States may also impose a family cap, that is, give no additional money for children born while mothers are on welfare (Leven-Epstein, 1996).

Since many teenage mothers receive welfare for 10 years or more, time limits present a major challenge and an economic recession may lead states to close down eligibility for new recipients of public aid. The positive argument however, behind welfare reform for adolescent mothers is largely an economic one.

Faced with a time-limited opportunity to raise children at home with governmental support, female adolescents will no longer have the monetary incentives for pregnancy and disincentives for employment, or marriage. Similarly, school and work requirements may provide a necessary incentive to aid some young mothers in finishing their education and obtaining employment, possibly leading to improved self-esteem and better psychological functioning (Leven-Epstein, 1996).

It is also possible that the forced co-residency requirement may increase tension between some mothers and grandmothers and lead to poorer parenting, especially for older adolescents. And lastly, the

provision concerning fathers will increase the number of legally recognized father-child relationships and possibly will increase the father's monetary contributions to their children and also may improve the amount of interaction and the emotional bonds between fathers and their children. While substantial funds have been set aside for new abstinence education programs for adolescents, no funds are targeted for family planning or other types of programs to prevent teenage pregnancy.

Taken together, the new policies are likely to produce significant changes in the lives of many adolescent mothers and their children. The direction and meaning of these changes are unknown at this time because the new programs are just beginning to be implemented (Leven-Epstein, 1996).

The Great Society programs and the civil rights movement of the 1960s identified early childbearing as contributing to a cycle of poverty, thus linking it to economic issues and making it amenable to federal solutions. These programs provided services to minority or poor populations in the area of medical and family planning services.

The 1980s and the Reagan Administration saw the linkage of issues of birth control, sex education and abortion, through the efforts of the growing New Right Conservatives who focused on social issues rather than the traditional conservative interest of foreign policy. The shift was responsible for removing the issue of adolescent pregnancy from the public health and social services arena into the political arena (Rothenberg and Sedhom, 1990).

The pattern of public policy and legislation on adolescent pregnancy has been too narrowly focused at the individual, and on adolescent behavior, instead of focusing at the society level. The assumption has been that adolescent pregnancy and childbirth result in decreased levels of education, decreased employment opportunity, and low self-esteem and perpetuate a cycle of poverty.

It is now understood that poverty is a course of early childbearing, rather than its consequence. Males (1994) explained that poverty was actually a key predictor of early pregnancy and cited a 1988 study which indicated that the state of Louisiana had a teen pregnancy rate 2.5 times higher than Minnesota and a poverty level among teens of 31.2%, as compared with 12.4% in Minnesota.

The solution to the problems of adolescent childbearing will require multidisciplinary approach, and is linked to the larger issues of welfare, racism, unemployment, child-care and the minimum wage. Primary prevention which focuses on the delay or abstention from sexual activity or the practicing of effective contraception will be far more cost-effective than secondary prevention, requiring intervention that take place at the point of pregnancy and may involve abortion, giving birth or adoption.

The changing of the gender norms that link masculinity with dominance and femininity with passivity should be addressed through sex education. The male behavior and responsibility in the cause of teen pregnancy should also be addressed, because California vital statistics show that men older than high school age account for 77% of all births among women of high school age (ages 16 to 18) (Males, 1994). And as the Alan Guttmacher Institute (1993) estimated, the government spent more than $25 billion for social, health, and welfare services to families begun by adolescent mothers and that babies born to teenage mothers in 1970 will cost US taxpayers more than $7 billion over the next twenty years.

Socioeconomic Status (SES)

Childhood poverty is very prevalent in America, and in certain ethnic and racial minority groups, it is epidemic. As of 1974, 22% of American children lived in families with cash incomes below the poverty level and American children today are doing worse than their American counterparts three decades ago. The rates of childhood poverty among African American, Native American, and Hispanic children are typically two to three times higher than that of White children (US Bureau of the Census, 1996).

Institutional barriers and structural factors have contributed to these racial and ethnic disparities, because of long-standing discrimination in education, employment, and housing. African Americans, as compared with Whites, have lower levels of education; hold jobs with higher rates of displacement; and lower rates of re-employment following lay-offs. Higher rates of mother-headed families have also given rise to higher poverty rates among African American children, a disparity that has been linked to the shrinking pool of marriageable African American men brought on by their deteriorating economic status (Wilson, 1986).

Unlike poverty status, socioeconomic status (SES) signifies an individual's family or a group's ranking on a hierarchy according to its access to or control over a combination of valued commodities such as wealth, power, and social status. Dispute exists among social scientists about how SES should be defined and measured. However, there is agreement that parental occupation, parental education, family income, prestige, power and certain lifestyles are important components of SES which are less likely to change markedly from one year to the next than is income relative to need (House, 1981).

While it is not yet known how changes in poverty and income status act synergistically with more stable indicators of SES to influence development, Duncan et al. (1994) reported that poverty and income status have effects on children's development independent of parental education. Many researchers have assessed the impact of poverty and SES on numerous indicators of cognitive functioning during early childhood, but the most prominent of these indicators are IQ test scores and more recently, performance on the Peabody Picture Vocabulary Test (PPVT).

The PPVT provides an estimate of children's hearing, vocabulary and verbal ability and is a good predictor of school performance and literacy. Duncan et al.'s (1994) investigation based on longitudinal data from the Infant Health and Development Program (IHDP) demonstrated that family income and poverty status were significant predictors of IQ scores in five-year olds, even after accounting for maternal education, family structure, ethnicity, and other differences between low and high income families. Family income and poverty status were found to be more powerful predictors of IQ scores than was maternal education (Smith et al, 1997).

Persistent poverty has been found to have more adverse effects than transitory poverty of pre-school children. The children who experience both types of poverty score lower than never-poor children (Smith et al, 1997). The impairment of children's physical health status at birth and diminution or lessening of children's access to resources that buffer the negative effects of perinatal complications, are major pathways by which socioeconomic disadvantage hinders cognitive development during the early years.

Prematurity, especially very low birthweight, increases infant's risk of a series of respiratory, neurological, and cognitive problems, including birth asphyxia, apnea, cerebral palsy, seizure disorders, visual and motor-coordination problems, mental retardation and learning disabilities. Because of inadequate nutrition and substandard, delayed or total lack of prenatal care, poor infants are over-represented in any premature sample (gestational age of 36 weeks or less and a birthweight of less than 2,500 grams). Although a disproportionate number of premature infants are born to adolescent mothers, it is not clear whether this is solely a consequence of inadequate prenatal care or whether maternal age itself is a risk factor (Crooks, 1994).

Lead poisoning is another important pathway whereby poor children's cognitive functioning is undermined. Elevated levels of lead in the blood are associated with cognitive deficit, lower school achievement, and long-term impairment of neurological function (Needleman et al., 1990). Poor children, especially those living in inner-city neighborhoods, have higher levels of lead in their blood than do nonpoor children. This is due to high rates of residence in

older housing that contains lead paint and lead-soldered pipes and to increased exposure to industrial and automobile air pollution.

Lead poisoning is also more common among African American children than White children, a disparity traceable to long-standing housing discrimination that has relegated African Americans in disproportionate numbers to poor, urban neighborhoods, where inadequate housing units and local level industrialization are concentrated (Crooks, 1994 and Massey, 1994).

Poor and low-SES children, on average, perform significantly worse than nonpoor and middle-class children on numerous indicators of academic achievement. These include achievement test scores, grade retention, course failures, placement in special education, high school graduation rate, high school dropout rate, and completed years of schooling (Conger et al., 1997). But public welfare as a source of income for poor families has also drawn criticisms from some policy analysts on the grounds that it causes intergenerational dependence by undermining children's self-reliance and motivation and economic attainment (Greenberg, 1996).

Several theories have assumed that there is more crime in poor neighborhoods because living in a poor neighborhood increases adolescents' chances of committing antisocial and delinquent acts. In a rare study of neighborhood effects on preschoolers' socioemotional functioning, Duncan et al. (1994) concluded that having more low-income neighbors predicted higher levels of externalizing problem behaviors among five-year olds (e.g. temper tantrums, destruction of objects). But other studies have also reported that parents in poorer neighborhoods may be less prone to reduce aggression and acting out in children because the need for children to defend themselves through such behaviors is greater in poorer neighborhoods.

Studies on the effects of poverty suggest that policies that raise the incomes of poor families will enhance children's development, especially their cognitive functioning and educational attainments. The effects of the nonlinearity of income on cognitive and academic functioning are consistent with the belief that "reducing poverty is associated with improved outcomes for children, whereas increasing affluence is not". It is very critical to the future of a society that

its children become competent adults and productive citizens and therefore, the society and parents share a stake in the development of competence and understanding the process that facilitates and undermines it (Garbarino, 1992).

Race and Ethnicity

The use of the word "race" first appeared in an English publication of a poem by William Dunbar in 1508. The origins of the word race not withstanding, a good deal of recent scholarly discourse has been devoted to the theoretical formulations and methodological approaches concerning the meaning and significance of racially classified social groups (RCSGs), in health and medicine.

The conventional opinion in the social sciences is that race is essentially a social concept depicting a form of social stratification rather than a set of distinct group of genetic predispositions or characteristics (King and Williams, 1995).

Historically, Blacks were regarded as inferior beings who were genetically endowed with limited intellectual abilities, physiologically suited to withstand the toils of agrarian production and whose physical health could be explained by their distinct

"racial" biology (McBride, 1989). The designation of 'race' as a biologic or genetic category evolved from deeply rooted beliefs about inherited differences among visibly distinct groups of human beings. These groups were distinguishable solely by phenotypic attributes such as skin and eye color, hair texture and facial features that were believed to determine among other things health, intellect, culture and societal advancement (Marks, 1995). And so the inquiries into group genetic differences have been only but a step away from conclusions about genetic deficiencies about minority groups.

The minority group social status, risks of disease/illness, health resources and access, and psychological and physical well-being of African Americans are products of society's racism. Kings and Williams (1995), defined racism as a set of processes or structures that promotes or results in an inequitable distribution of societal resources based on ideology purporting the biologic/cultural, or social inferiority of a RCSG. Within the health care system there exists various forms of discrimination including treatment disparities, prejudice and bias, and stigmatization (King, 1996).

Stotts et al. (1991) in one of their studies, described the lower rate of smoking among Black adolescents as lagging "behind those of White children", as opposed to describing the Blacks as doing better thus negatively viewing difference in risk behavior when it appears to favor the minority group.

In a study termed the "weathering hypothesis", Geronimus (1992) claimed that since African Americans tend to experience high rates of health problems, such as elevated blood pressure and diabetes, in their late 20s and beyond, and because they are more likely to receive aid from both their families and the government during their teen years than when they are adults, early childbearing is a logical and adoptive practice for this group. The weathering hypothesis has since remained controversial.

Gardner and Goldenberg (1995) in their study of racial differences, reported the following: (a) that there is little evidence that being classified in any particular racial or ethnic group increases the risk of a woman having a spontaneous first trimester abortion over and above the background rate of 15% to 20%; (b) since differences in second trimester abortion by race are not clear, Black

women nevertheless are more likely to have increased losses in the 16-20 week range than White women; (c) Hispanic women have a lower risk of fetal death than White women, whereas Black women had considerably greater risk. Black women have more fetal deaths because they are likely to have hypertension and diabetes and after adjusting for medical conditions and behaviors, they have about twice the risk of fetal death; (d) the overall Black neonatal mortality is much higher with Hispanic neonatal mortality only slightly greater than White, whereas most Asian groups have a neonatal mortality equivalent to or less than that of Whites; (e) Blacks have higher rates of post neonatal mortality than the two groups; and (f) Black women have twice the rate of preterm births as compared to White women while Hispanic women have similar rates of preterm as Whites.

They also concluded that Black infants of equivalent gestational ages born at term weigh about 150g less than White infants, while Hispanic infants tend to have similar weight as White infants. Growth retardation, which is due to smoking, maternal hypertension, and low maternal weight is higher among Black women than Whites.

Gardner and Goldenberg (1995) concluded that there is clear association of race with both the size of infant at birth as well as when the baby is born. They also explained that other ethnic groups who are socioeconomically disadvantaged such as Hispanics, deliver infants of similar size and gestational ages as do White mothers, and so the Black/White differences may not be necessarily due to social factors but cultural and therefore could be correctable.

Duplessis et al. (1997), reported that African American teens have the highest birth rate among adolescents in the Unites States 116/1000 births compared to 100/1000 among Whites and 43/1000 among Hispanics for teens ages 15-19 years. They also stated that among the very youngest mothers (ages 10-14), the risk of neonatal mortality was higher for Whites than African Americans. While among African Americans, post neonatal mortality rate was higher overall, but decreased with increase in maternal age. Low birth weight, prematurity, and infant mortality risks were higher for African Americans overall.

Many investigators have reported racial differences in infant mortality rates for US populations. In general Black infant

mortality rates are twice that of Whites and Black teenage mothers experienced the largest proportion of spontaneous fetal death (23%) compared with White (10%) and American Indian (11%) teenage mothers (Buck et al., 1995).

Frisbie et al. (1997) concluded that the risk of adverse pregnancy outcomes has remained about twice as high for African Americans as compared to the Whites. But the risk of adverse birth outcomes for Hispanics has remained very similar to that of non-Hispanic Whites, even though the Hispanics are characterized by a high-risk demographic and socioeconomic description. Their explanation of this paradox was that the disadvantageous demographic and socioeconomic status of the Hispanics are offset by a cultural orientation which promotes many healthful behaviors such as more nutritious diets and avoidance of smoking.

Determinants of Pregnancy Outcomes

Nutrition:

Adolescence is a time that may be best defined by growth spurt. Except for infancy, the most rapid physical growth occurs during this time. This period of rapid growth is accompanied by cognitive,

emotional and hormonal changes, and these changes create specific nutritional needs. Because of the greater need for nutrients during this time, adolescents are vulnerable to inadequate nutritional intakes. In addition, negative family, peer or media influences may further complicate an already marginal diet. The nutritional requirements of a pregnant adolescent is further complicated by both the demands of the mother and that of the fetus (Institute of Medicine, 1990).

Maternal nutrition plays a very important role in optimizing pregnancy outcomes, and unlike other heredity or pre-existing factors, nutritional status is amenable to change. Dietary modification can also improve maternal comfort during pregnancy and promote successful lactation after birth. It is known that maternal nutrition plays a role in the cause of certain types of fetal malformation or spontaneous abortion. Because these adverse effects occur very early in gestation, nutritional intervention must begin before pregnancy.

Maternal weight-for-height ratio before pregnancy (often expressed by body mass index as weight/height^2) is an important

determinant of fetal growth. Low birth weight (LBW) and infants who are small for gestational age (SGA) are more prevalent in underweight women, whereas overweight women deliver a higher proportion of infants who are large for their gestational age (LGA) (Institute of Medicine, 1990).

Increased risks of maternal complications, including premature rupture of the membranes, infections, and anemia have also been reported for underweight (< 90% of ideal weight for height) women. Fetal death may be more common in women who begin pregnancy overweight and gestational diabetes, hypertensive disorders, urinary tract infection, labor abnormalities, and cesarean section delivery are more common in women who begin pregnancy more than 135% of ideal weight for height. Given the risks at both extremes of maternal weight and because it is rarely possible to modify weight for height once pregnancy occurs, it is important to recommend that a woman achieve a body mass with 90% to 135% of ideal weight for height prior to conception (Edwards et al., 1997).

Neural tube defects (NTD) are the most common major congenital malformation in the United States, and once a woman has delivered

one infant with NTD, the recurrence rate is 2% to 10%. The critical time for neural tube development is 17 to 30 days after conception. Several studies suggest that supplementation with folic acid just before and around the time of conception may prevent these defects. Preformed Vitamin A (but not beta-carotene) in large doses have also been shown to produce spontaneous abortion and fetal malformations (Institute of Medicine,1990).

Maternal weight gain during pregnancy is an important determinant of fetal growth. As weight gain increases, so does birth weight. The Institute of Medicine (1990) recommendations for maternal weight gain range from 15 to 40 pounds at term, depending on the pre-pregnancy weight status of the mother and other factors such as age, race, and height. A recent multivariate study of 6690 women reported that those women who gained within the IOM guidelines for their pre-pregnant weight-for-height ratios had better pregnancy outcomes. Gains below IOM recommendations were associated with an increased risk of having infants who were small for gestation age (SGA), and gains above IOM recommendations were associated with increased risk of infants who were large for their

gestational age (LGA) and cesarean deliveries (Edwards et al., 1997).

Total gestational weight gain in full-term pregnancies has been shown to be an important determinant of birthweights. The recommended weight gain ranges (based on the women's pre-pregnancy weight) are 28 to 40lbs for underweight women, 25 to 35lbs for overweight women and at least 15lbs for very overweight women (Edwards et al., 1997). About 14% of the LBW infants in the US can be attributed to the mother's inadequate gestational weight gain (National Academy of Sciences, 1990). Adequate weight gain during pregnancy is affected by a number of socioeconomic variables, including income and education. It also been reported that the risk of LBW decreases with at least 12 years of education (Kleinman, 1990).

Infants born to women who gained less than the recommended amount of weight during pregnancy were at greater risk for low birth weight than were infants born to women who gained at or above the recommended weight. The incidence of low birth weight was highest among Black infants born to women who gained less than the recommended amount of weight and lowest for Native

American infants born to mothers who gained more than the recommended amount. Although it seems that gaining more than recommended amount of weight was beneficial, there may be other risks to gaining too much weight during pregnancy, such as fetal macarosomia, delivery complications, and excess weight retention after pregnancy (Keppel and Taffel, 1993).

Prenatal care:

The current system of prenatal care is based on the model first developed in the late 1800s to manage and diagnose symptoms of preeclampsia (Merkatz and Thompson, 1990). Today, prenatal care still includes routine evaluation of blood pressure, urine and weight. Screening for other maternal risk indicators and indicators of abnormal fetal development have now been included as part of routine prenatal care. Routine prenatal care now focuses primarily on recognition and prompt treatment of complications rather than on health promotion and prevention. This model of prenatal care has been effective in decreasing maternal and infant mortality. When prenatal care is received early and continuously, it is highly associated with improved perinatal morbidity (Institute of Medicine,

1988 and US Department of Human Services, 1991).

The pattern of the current prenatal care visits was determined by the American College of Obstetricians and Gynecologists (ACOG) in 1988 (ACOG, 1992). The first visit usually occurs in the first trimester, with monthly visits during the first 28 weeks of pregnancy. Visits are then scheduled every 2 to 3 weeks until the 36th week of gestation. Those with medical or obstetric complications are usually seen more frequently.

The effectiveness of the system of prenatal care has never been evaluated, but surprisingly it has existed without changes for many years. The infant mortality rate has declined, under this model, but now appears to have stabilized (Nurses Association of American College of Obstetricians and Gynecologists, 1992).

The second factor indicative of the effectiveness of prenatal care is the incidence of low birth weight (LBW) and prematurity. Arnold and Gred (1992) argued that while LBW is the primary risk factor associated with infant mortality and morbidity, its incidence has not declined in more than 10 years. About two thirds of all infant deaths and neonatal deaths are accounted for by LBW infants. The

rate of prematurity has also remained relatively constant at about 7% despite the continued technological advances (US Dept. of Health and Human Services/National Center for Health Statistics, 1993).

The cost benefit as a factor in determining the effectiveness of prenatal care has been well established. For every dollar spent on prenatal care, 2 to 11 dollars are saved in costs associated with the treatment of prematurity and complications after birth. These costs, are also contained by increasing birth weight and lowering the need for subsequent hospitalization. But the cost savings are generally under-estimated because cost estimates rarely include the family and the personal costs of having LBW infant or those associated with long-term disability and mortality. These infants have higher chances of suffering from chronic conditions such as, cerebral palsy, blindness, mental retardation and learning disabilities and their disabilities place a continuing financial burden on the family and may eventually limit their ability to earn a living during adulthood (Institute of Medicine, 1988 and US Department of Human Services, 1991 and 1993b.)

Medicaid, which is a publicly financed insurance, was designed to

eliminate the financial barriers of access to care. The Medicaid program is the largest single source of health-care financing for the poor which is generally believed to have been responsible for the increased use of medical services by low income individuals since its creation in 1965. The Medicaid enrollment process is, however, lengthy, difficult and demeaning, with long waiting periods from entry into the system to enrollment within the program. York et al. (1996) summarized several studies which concluded that the major barriers to receiving prenatal care are finances, problems in the delivery of prenatal services, women placing a low value on prenatal services, and negative reactions to pregnancy. They also stated that unplanned pregnancy and ambivalent or negative feelings about pregnancy was associated with inadequate prenatal care.

Cigarette Smoking:

Trends in the 1960s and 1970s indicated that smoking prevalence was on the decline after reaching an all-time high, but recent national figures have shown a trend toward higher rates of cigarette smoking in the adult female population. There are approximately 22.8 million women in the United States who call themselves

smokers or 23.5% of the female population (Centers for Disease Control, 1993).

Historically, differences existed in the prevalence rates of cigarette smoking between men and women, with men more likely to be smokers than women. Two reasons that have accounted for the change toward closer prevalence rates among sexes are lower smoking cessation rates in women versus men and higher smoking initiation rates among female adolescents (34.6%) than their male counterparts (33.4%).

Differences in smoking rates among women vary depending upon race, education and income. Higher prevalence rates exist among women with a high school education (31%) than among women with a college education (17%). Women with incomes below poverty level have higher rates of smoking than do women with higher incomes (Ockene, 1993). The order of smoking prevalence rates are Native American women 35.2%, Black women 31.5%, White women 26.9%, Hispanic women 15.5%, and Asian-Pacific 7.5%. Other factors influencing continued smoking during pregnancy have been reported to include: (a) lives alone; (b) lives with a family member who

smokes; (c) high cigarette consumption before pregnancy; (d) less than 12 years of education; and (e) initiated smoking in early adolescence (CDC, 1994).

Kilby (1997) stated that maternal smoking increases the risk of spontaneous abortion, perinatal mortality, low birth weight, premature labor and birth, rapture of membranes, fetal tachycardia, placenta previa, abruptio placentae, and long-term physiologic and cognitive development delays.

More recent studies have also reported lower intelligence scores in children exposed to cigarette smoke in utero as late as age 3 and 4 years. And sudden infant death syndrome (SIDS), first associated with smoking during pregnancy as early as 1966, has led to the general conclusion by other recent studies that cigarette smoking increases the risk of crib death.

Substance Abuse:

Substance abuse during pregnancy has continued to be a wide-spread health problem. There is also mounting evidence of the adverse infant health developmental impact of material substance use postpartum. Pregnant adolescents may represent an especially

high-risk group to target for substance use-related interventions given evidence of their already higher risk of experiencing both long-term and short-term adverse birth outcomes.

Treatment evaluation studies indicate that some adverse birth outcomes associated with perinatal substance use could be prevented by providing interventions during prenatal care. In addition, given the frequency of the co-occurence of substance use and emotional or behavioral problems, early identification and referral may ease the burdens many adolescents experience during the early postpartum period which lead some to resume substance use, as well as minimize the risks of mental illness later in life (Barnet, 1995).

Estimates of substance use among pregnant adolescents range from 11% to as high as 52%, similar to those for non-pregnant adolescent females and the most common substances used are cigarettes and alcohol. Substance use rates are higher among White pregnant adolescents than among other ethnic groups, and depend on type of substance (Wiemann et al., 1995).

The use of illicit substances among pregnant women has been on

the increase over the last few decades. But the problem of drug abuse during pregnancy has affected women in all communities, races, ages, cultures and socioeconomic levels and 11% of all live births each year, are drug-affected infants.

If a child smoked tobacco or drank alcohol, they were 65 times more likely to use marijuana than a child who never smoked or drank. But children who used marijuana were 104 times as likely to use cocaine compared with their peers who never used marijuana (National Institute on Drug Abuse, 1995).

Factors that are related to drug use during adolescence include poor self-image, low religiosity, poor school performance, parental rejection, family dysfunction, abuse, under-or over-controlling by parents and divorce (Block and Keyes, 1988).

Physical Abuse:

Smoking, physical abuse, and substance use during pregnancy are recognized public health problems, which have detrimental effects on maternal health and infant birth weight. Large amounts of data link smoking and substance use during pregnancy to low birth weight and more recent research connects physical abuse during pregnancy

with lower infant birth weight. Abused women have reported blows to their pregnant abdomen, breasts and genitals accompanied by sexual assault (Parker et al., 1994). Although studies have not linked tobacco use during pregnancy to physical abuse, several authors have documented the association of alcohol and illicit drug use during pregnancy with physical abuse. These studies have reported that adolescents who used illicit drugs, experienced increased physical abuse during pregnancy and increased chances of having a male partner who used illicit drugs and alcohol.

Childhood Sexual Abuse:

Girls who were sexually abused are more vulnerable to distorted sexual functioning, sexualization of relationships, poor self-esteem, depression, interpersonal difficulties, and increased victimization. These and other negative effects of childhood sexual abuse may be linked to behaviors that increase the adolescent girl's risk of pregnancy (Beitchman et al., 1992).

The long-and short-term consequences of childhood sexual abuse are well documented. These consequences include fear and anxiety, anger and hostility, shame and guilt, inappropriate sexual behavior,

and depression. Other symptoms often associated with traumatically stressful experiences were also observed in children who were abused sexually. These include somatic complaints, sleep disturbances, withdrawal from peers and adults, difficulty concentrating, increased arousal or hyperalertness, intrusive thoughts, and flashbacks of the experience (Campbell et al., 1992).

Finkelhor (1986) concluded that the "traumagenics" of childhood sexual abuse, including traumatic sexualization, stigmatization, betrayal and powerlessness, were characteristics that could contribute to an increased risk for behaviors leading to adolescent pregnancy. He further stated that these consequences of sexual abuse have been linked with sexual acting out in prostitutes, runaways, and delinquents while others have suggested that the incidence of adolescent motherhood may be influenced by childhood sexual abuse. Esparza and Esperat (1996), in a more recent study examined the incidence and effects of childhood sexual abuse on the lives of African American and Mexican American adolescent mothers. They too, concluded that childhood sexual abuse may be related to the vulnerability for adolescent motherhood.

Sexually Transmitted Diseases (STDs) and other Infections:

Adolescent sexuality has received considerable attention due to the unintended pregnancy and more recently, the rising rates of sexually transmitted diseases partly because of the escalation of sexual involvement by younger and younger adolescents.

One of the STDs causing the most concern is HIV. The Centers for Disease Control and Prevention (1996) reported that "in many US communities, HIV infection is the leading cause of death among young men and women". Since it is generally accepted that there is an average 10-year lag between infection with HIV and series AIDS-related illness, it can be concluded that many of the young adults dying from HIV/AIDS were infected initially as adolescents.

Minorities are at a much higher risks than Whites. Among women and children, African Americans represent the majority of cases (59% and 63%, respectively) with almost all infected children (90%) acquiring HIV perinatally through their mother (CDC, 1996 b). The perinatal AZT prophylaxis has been shown to reduce the risk of transmission of the virus from an HIV-infected mother to her newborn by as low as 8%. Given the reduced transmission risk, the

infected pregnant women may give birth to a healthy child, but she is likely to die before the child reaches adulthood. She may also give birth to an infected infant, whose illness is likely to be difficult and whose mortality is imminent. Confronted with these possibilities, an HIV-infected woman may decide to terminate her pregnancy, undergo a sterilization procedure, be sexually abstinent, or become pregnant anyway (Bessinger et al., 1997).

Pregnancy Outcomes

Infant Birthweight:

In epidemiology, birthweight is regarded as the single most useful health indicator. As an outcome indicator, birthweight reflects the health experience of the pregnancy (CDC, 1995). But as a risk indicator, birthweight predicts infant morbidity and mortality. In general, low birthweight (LBW) is of greatest concern because of far higher mortality of LBW infants than infants in the normal birthweight range.

In 1995, 285,000 LBW infants were born in the United States, representing 7.3% of all births. Among these births, African Americans were shown to have a twofold greater LBW rate and a

threefold greater very low birthweight (VLBW) rate than Whites (Collins, Walls and David, 1997). These results do not also explain the relatively favorable birth outcomes of Hispanics, in whom low birthweight is one half that of African Americans despite comparable sociodemographic profiles and rates of utilizations of prenatal care (Polednak, 1996).

Low birthweight can be caused by intrauterine growth retardation (IUGR), shortened gestation (preterm delivery), or a combination of the two. The preterm low birthweight infants are two to three times more likely to die in the first year of life compared with a full-term, LBW infant (Collins, Walls and David, 1997).

Very low birthweight (VLBW) infants used to have a high mortality rate. However, since the early 1970s, survival rate has increased and the rate of handicap in surviving infants has also decreased.

Compared with infants of higher birth weights, very low birthweight (VLBW) infants are at much greater risk of death and poor developmental outcomes such as mental subnormality, cerebral palsy, blindness, hearing loss, and other handicapping conditions.

They were more than four times as likely to require special education than normal birthweight infants and a study of 137 VLBW infants followed through age 12 indicated that growth problems persist with shorter body length, lower birthweight, and smaller head circumference than the controls. An increased proportion of handicap was also found in VLBW infants (Collins et al., 1997).

Preterm Birth:

Preterm is the leading cause of morbidity and mortality in infants without congenital anomalies. Low birthweight is generally considered to be less than 2500g, and preterm fewer than 37 completed weeks of gestation. Preterm birth arises from one of three mechanisms: preterm labor, preterm premature rupture of membranes (PROM), or medical intervention in pregnancy. The most significant risk factors are demographic, such as age, race, education and other markers of socioeconomic status.

Women at the extremes of childbearing age are at elevated risk as are women who are not White. The preterm birth rate is higher for Blacks even after controlling for other demographic factors. Black infants born to college-educated parents are twice as likely to fall

into the 1500g to 2499g weight category and three times as likely to weigh less than 1500g as their White counterparts.

Low pregnancy weight has been associated with elevated risk of preterm birth as has been obesity. The use of illicit drugs, cigarette smoking, negative attitude toward the pregnancy, psychosocial stress, and pregnancy history have all been linked to preterm birth (Schoendorf et al., 1992).

Other more recent studies have also demonstrated that preterm children have a higher prevalence of cognitive deficits and learning difficulties, resulting in grade repetition and increased utilization of remedial and educational resources (Powls et al., 1996).

Congenital Abnormalities:

Congenital malformations are a leading cause of infant death. The development of birth defects registries in the last 25 years has provided a way to track trends in the occurrence of malformations. Additionally, the registries can be used for health planning, for needs assessment, and for follow-up studies of the long-term effects of birth defects. The mortality rates of children with congenital malformations are frequently determined from vital

records or, for specific malformations, and from hospital case series. Data from vital records are limited by lack of completeness and accuracy in the reporting of birth defects on birth certificates (Flake and Ryckrnan, 1997).

Stillbirths:

Stillbirths continue to make up the greater half of perinatal mortality even though the greater improvement have taken place with respect to neonatal mortality. The rate of stillbirth still remains relatively constant. Fifty percent of all these deaths are unexplained, and occur in normally formed singletons and in the last trimester of pregnancy of healthy women.

Self-monitoring for fetal activity (fetal movement counting) provides a simple, rapid and economical method of identification. But fetal movement counting has not been part of routine perinatal care. This is because physicians have not encouraged mothers to play an active role in monitoring fetal well being. Given the possible role for fetal movement counting in reducing stillbirth rates, it should be recommended as an item to be undertaken during the perinatal care (Nelson, 1993).

Spontaneous Abortion:

For the determination of the rate of spontaneous abortion, there must be a verification of a normal pregnancy and an accurate determination of gestational age at the time of spontaneous loss. The risk of spontaneous abortion increases with advancing maternal age, with a risk of 1.4% at younger than age 30, of 2.6% from 30 to 34, and 4.3% for those older than 35 in clinically recognized pregnancies. The risk is also increased among women with vaginal bleeding in pregnancy and a previous history of spontaneous abortion. Ultrasonography is a valuable diagnostic tool to determine fetal viability and with the advent of transvaginal ultrasonography, it is possible to detect fetal heart activity before 6 weeks of gestation (Rempen, 1990).

Growth Retardation:

Intrauterine growth-retarded infants are identified as those whose fetal growth ratio is below 0.85. The fetal growth is obtained by dividing an infant's observed birthweight at a given gestational age by the mean birthweight for gestational age of a sex-specific fetal growth distribution and has been shown to be a

useful proxy for intrauterine growth retardation (CDC, 1991). The cut out point of 0.85 has been found to be valid when compared against clinical evidence of immaturity, including ultrasound estimates.

Frisbie et al. (1997) reported that intrauterine growth retardation was significantly more likely to occur among African American women and among primigravidas. They reported that women who had a low level of education, who relied on government aid to pay for delivery, whose body mass and weight gain during pregnancy were low, who experienced vaginal bleeding, and who smoked during pregnancy were at increased risk of interuterine growth retardation.

Absence of prenatal care was found to greatly increase the chances of a woman giving birth to a growth-retarded infant. It was also found that the odds for intrauterine growth retardation grew as smoking increased from moderate levels to higher levels. Concomitant decrease in odds for intrauterine growth retardation and decrease in smoking was also noticed (Frisbie et al., 1997).

Infant Mortality:

The significance of infant mortality as an important indicator of a nation's health status and well-being has been well documented.The infant mortality rate in the United States has continued to decline steadily since 1933. But it is consistently higher than that for many other industrialized countries. The relatively unfavorable international standing of the United States in terms of infant mortality is attributed in large measure to the substantial racial (Black/White) disparity in infant survival and associated socioeconomic inequality that have existed in the country for a long time. This large proportion of the racial disparity in infant mortality rates has been demonstrated to be due to a high rate of very low birth weight infants among African Americans (MacDorman and Rosenberg, 1993).

Since 1960, rates for in infant mortality and low birthweight for Blacks have been twice those of Whites. The Surgeon General's national health objectives for the year 2000 include the reduction of the overall infant mortality rate to under 7 per 1000 live births and reducing the infant mortality rate for African Americans to under 11

per 1000. But so far, long-term trends in US infant mortality and causes of infant death have not been uniform for various socioeconomic and demographic sub-groups of the population (King and Williams, 1995).

Although congenital abnormalities and sudden infant death syndrome have been consistently ranked as the two most common causes of infant mortality in this country, infectious diseases which have been ranked much lower were reported to be the underlying cause of death for over 16000 infants, representing the fourth leading cause of infant mortality (CDC, 1993).

CHAPTER III

MATERIALS AND METHODS:

In descriptive epidemiological studies, data are summarized according to time, place, and person. The study must be able to answer the when, where, and who questions in all investigations and lastly the why question. In a descriptive analysis of adolescent pregnancy and birth outcomes in Tarrant County, Texas, data on general Births and linked Infant Birth and Death Files for Tarrant County, Texas, were used to determine outcomes for infants born to all adolescents nineteen years and younger. Data were obtained from the Bureau of Vital Statistics of the Texas Department of Health at Austin, Texas at a cost of US$ 170.

Cases were selected based on the mother's age and county of residence; births and deaths which occurred in Tarrant County to residents of other counties were excluded. Linked Infant Birth and Death Files for Tarrant County, Texas, were used to determine the outcomes for infants born to White, African American, and Hispanic adolescent mothers for the period from 1991 through 1995.

Included in the analysis were infants whose mothers were equal to or less than 19 years of age, resided in Tarrant County, Texas, and had a recorded race of White, African American (Black) or Hispanic. The mother's race/ethnicity was used in assigning race/ethnicity to the infants. Data on all births (singleton, twin, or multiple) to adolescents for 5 years from 1991 to 1995 were evaluated.

The variables, from the general birth file and the linked birth and death files which were expected to influence the dependent outcomes, birthweight and infant mortality, were identified and recoded from string to numeric. Both files were then combined into a working file using the birth certificate numbers that had been sorted in ascending order as the matching variable. The variables were created, named and recoded prior to the logistic analysis. Frequency summaries and bivariate crosstabulations were performed on each variable to determine its utility and accuracy.

The independent variables to be used as predictor variables were recoded into categorical variables as follows:

a) Mother's Age:

- 14 and under.

- 14 years old.
- 16 years old.
- 17years old.
- 18 years old.
- 19 years old.

b) Infant Birth Weight:

- Very Low Birthweight (VLBW): less than 1500g.
- Low Birthweight (LBW): 1500g to less than 2500g.
- Normal Birthweight (NBW): 2500g and greater.

c) Gestational Age:

- Very Low Gestational Age (VLGA): less than 28 weeks.
- Low Gestational Age (LGA): 28 to 36 weeks.
- Normal Gestational Age (NGA): 37 weeks or greater.

d) Mother's Weight Gain:

- Zero lbs. to 30 lbs. Gain.
- 31 lbs. or greater Gain.

e) Mother's Education:

- High School and Above.
- Middle School and Below.

f) Mother's Ethnicity:

- White.
- Black.
- Hispanic.

g) Marital Status:

- Married.
- Unmarried.

h) Mother's Alcohol Use:

- Yes.
- No.

i) Mother's Tobacco Use:

- Yes.
- No.

j) Month Prenatal Care Began:

- During the 1st Trimester.
- During the 2nd Trimester.
- During the 3rd Trimester.

k) Number of Prenatal Visits:

- 11 to 20 Visits.
- 1 to 10 Visits.
- No Visit.

l) Number of Cigarettes per Day:

- No Smoking
- 1 to 10 Cigarettes.
- 11 or More.

m) Number of Drinks per Week:

- No Drink.
- 7 or Less.
- 8 or More.

n) General Abnormality:

- Yes.
- No.

o) Any Kind of Congenital Abnormality:

- Yes.
- No.

p) Any Type of Risk Factors:

- Yes.
- No.

q) Parity:

- Yes.
- No.

r) Father's Education:

- High School and Above.
- Middle School and Below.

s) Father's Age:

- 13 through 19.
- 20 through 30.
- 31 through 45.
- 46 through 68.

t) Method of Delivery:

- Vaginal.
- Caesarian Section.

u) Birth Type:

- Singles.
- Twins or higher.

v) Age in Months at Death:

- Neonates (less than one month of life).
- First Six Months of the first year of life.
- Last Six Months of the first year of life.

The dependent variables, infant birthweight and Infant mortality were also recoded prior to entering the logistic regression analysis as dichotomous variables with values of 1 and 0. For the dependent variable birthweight, very low birthweight (VLBW) and low birthweight (LBW) were combined together and coded as 1 and normal birthweight (NBW) was coded 0. In the case of the dependent variable infant mortality, death was coded 1 and live birth was coded 0.

Infant mortality rate was calculated as the number of deaths of infants less than year old per 1000 live births. The neonatal mortality rate was defined as the number of infant deaths less than

28 days old per 1000 live births and post neonatal mortality rate was defined as the number of deaths of infants between 28 days and 1 year of age per 1000 live births.

The birthweight was categorized into three groups and summarized as percentages of the total. The same was true for gestational age of the infants. Preterm was defined as birth occurring with fewer than 37 completed weeks of gestation.

The total number of LBW and VLBW infants for the three racial categories and age groups was determined. Low birthweight was defined as birthweight equal to or greater than 1500 grams (g) and less than 2500 grams (g) whereas very low birthweight (VLBW) was defined as birthweight less than 1500 grams (g).

Independent predictors of infant births and deaths were identified by using a simple logistic regression analyses. In linear regression, the parameters of the model are estimated using the least-squares method while the maximum-likelihood method is used to estimate parameters of the model in logistic regression.

The backward stepwise method was used because it initially considers all the variables entered in the modeling and then removes

the variables that are found not to be contributing to the usefulness of the model.

At the same time, the simple contrast was used because it allows for the comparison of all the categories within the variable to the reference category. Prior to analyzing the data, records were excluded if data were missing on any variable in the specific model under consideration. Ninety-five percent confidence intervals were computed and statistical significance was assessed by two-sided P-values.

The following independent predictors entered the modeling process as categorical variables for infant mortality: mother's ethnicity; infant birthweight category; vaginal delivery; all maternal risk factors; number of prenatal visits; trimester prenatal care began; parity; mother's weight gain; mother's education; mother's age category; mother's marital status; gestation categories; general abnormality; birth type; congenital abnormality; and tobacco use.

The independent predictors that entered the simple backward stepwise logistic analysis as categorical variables for birthweight were: mother's age category; marital status; mother's education;

mother's ethnicity; mother's weight gain; parity; trimester when prenatal care began; all maternal risk factors; mother's alcohol use; sex at birth; birth type; all forms of congenital malformation; general abnormality; gestational categories; father's education; number of drinks per week; and number of cigarettes used per day.

Frequency summaries and crosstabulations of various variables were performed to give greater appreciation of the way data were arranged and managed. Various forms of risk factors, congenital abonormalities, general abnormalities, prenatal care, and methods of delivery were each combined into a single variable during the data analysis.

Factors that were poorly evaluated like father's age, and illicit drug abuse, were not included in this modeling process. The same was true for causal factors of infant deaths such as complications of labor, method of delivery, and abnormal conditions of the newborn.

Summary statistics (frequencies, crosstabulations and percentages) and backward stepwise logistic regression procedures were performed as described in the SPSS Manual (SPSS, 1997).

CHAPTER IV

RESULTS

The descriptive analysis of adolescent pregnancy and birth outcomes in Tarrant County, Texas was undertaken for births during the period from 1991 to 1995. There were a total of 14187 births to all Tarrant County adolescent mothers 19 years old or younger and 14132 births representing all births to white, Black and Hispanic adolescent mothers. The reduction represents 1.8% of all births from other ethnic groups indicating that very few other ethnic groups reside in Tarrant County, Texas.

The breakdown of total births to adolescents of Tarrant County on ethnicity was as follows: (a) White, 42.9 % (6064) of total; (b) Black, 24.0 % (3520) of total; and (c) Hispanic, 32.2 % (4548) of total number of live births (Table 1a). More white adolescents gave birth during the period of 1991 and 1995 in Tarrant County, followed by Hispanic adolescent mothers with Black adolescent mothers coming in last (Table 1a).

The number of births to White, Black and Hispanic adolescent mothers in Tarrant County, Texas decreased from 20.1 % in 1991 twice in a row to 19.6 % in 1992 and 19.5 % in 1993. This was then followed by a gradual increase again twice in a row from 19.5 % in 1993 to 20.2 % in 1994 and 20.6 % in 1995 respectively. A greater number of infant births to adolescents for all the ethnic groups under reference were registered in 1995 (Table 1b).

The age of the adolescent mothers was categorized as described earlier. Table 1c displays the birth distribution according to the mother's age category. It can be inferred from the table that most births, representing 59.6 % of the total births for the three ethnic groups, occurred to adolescent mothers in the 18 and 19 age groups, and only 2.5 % of the total births were experienced by those 14 or under.

Table 1d displays the distribution of mother's education. About 82% of the total number of adolescent mothers had high school education, with only 0.6% of the mothers reporting no schooling. While 82% of mothers had high school education, about 61% of the fathers had only elementary school education (Table 1e).

TABLE 1a.

DISTRIBUTION OF MOTHER'S ETHNICITY

RACE/ETHNICITY	FREQUENCY	PERCENT	CUMULATIVE PERCENT
WHITE	6064	42.9	42.0
BLACK	3520	24.9	67.8
HISPANIC	4548	32.2	100.0
TOTAL	14132	100.0	

TABLE 1b.

DISTRIBUTION OF YEAR OF BIRTH

YEAR	FREQUENCY	PERCENT	CUMULATIVE PERCENT
1991	2835	20.1	20.1
1992	2773	19.6	39.7
1993	2760	19.5	59.2
1994	2849	20.2	79.4
1995	2915	20.6	100.0
TOTAL	14132	100.0	

TABLE 1c.

DISTRIBUTION OF MOTHER'S AGE CATEGORY

AGE CATEGORY	FREQUENCY	PERCENT	CUMULATIVE PERCENT
14 and UNDER	349	2.5	2.5
15	878	6.2	8.7
16	1751	12.4	21.1
17	2733	19.3	40.4
18	3798	26.9	67.3
19	4623	32.7	100.0
Total	14132	100.0	

TABLE 1d.

DISTRIBUTION OF MOTHER'S EDUCATION

EDUCATION	FREQUENCY	PERCENT	CUMULATIVE PERCENT
ASSOCIATE	433	03.1	03.1
HIGH SCHOOL	11565	81.8	84.9
MIDDLE SCHOOL	1915	13.6	98.5
ELEMENTARY	133	00.9	99.4
NO SCHOOLING	86	00.6	100.0
TOTAL	14132	100.0	

TABLE 1e.

DISTRIBUTION OF FATHER'S EDUCATION

EDUCATION	FREQUENCY	PERCENT	CUMULATIVE PERCENT
ASSOCIATE	5	0.0	00.0
HIGH SCHOOL	5493	38.9	38.9
MIDDLE SCHOOL	24	.2	39.0
ELEMENTARY	8607	60.9	99.9
NO SCHOOLING	3	.0	100.0
TOTAL	14132	100.0	

Table 2 (a) displays the weight gain distribution of the cases. The results indicate that about 37% of all adolescent mothers gained weight in line with the recommendation of the Institute of Medicine range of weight gain. About 39 % of mothers gained less than the recommended range and about 22 % gained no weight. The distribution of weight gain included 21.6 % of the adolescent mothers who reportedly had zero weight gain. It is highly improbable to carry pregnancy to term and not gain even one pound of weight. This particular result could have been due to the errors of

misreporting or misrecording. The variable was therefore recoded as a dichotomous response; weight gain from zero pounds to 30 and from 31 pounds and greater, before it was entered in the logistic regression analysis.

The distribtion of gestational age categories from table 2b shows that about 10.5 % of the total number of births to the adolescent mothers from the three ethnic groups in the study had preterm deliveries. The percentage for normal gestational age was 89.5%.

Table 2c shows the distribution of births according to birthweight groups. The results indicate that about 92 % of total births were normal weight infants with birthweights equal to or greater than 2500g. The combined percentage of both VLBW and LBW was 8.2 % of the total births.

The results from Table 2d, indicate that only 1.2 % of all adolescent mothers used alcohol and about 10.3 % (Table 2e), used tobacco during pregnancy. Tobacco use was found to be much higher than alcohol use.

TABLE 2a.

DISTRIBUTION OF MOTHER'S WEIGHT

WEIGHT GAIN	FREQUENCY	PERCENT	CUMULATIVE PERCENT
0 Weight Gain	30508561	21.6	21.6
1 to 30 lbs. Gain	5511	39.0	60.0
31 to 60 lbs. Gain	5191	36.7	97.3
61 t0 90lbs. Gain	380	2.7	100.0
Total	14132	100.0	

TABLE 2b.

DISTRIBUTION OF GESTATIONAL AGE:

GESTATIONAL AGE	FREQUENCY	PERCENT	CUMULATIVE PERCENT
VLGA	261	1.8	1.8
LGA	1221	8.6	10.5
NGA	12650	89.5	100.0
TOTAL	14132	100.0	

TABLE 2c.

DISTRIBUTION OF INFANT BIRTHWEIGHT:

BIRTHWEIGHT	FREQUENCY	PERCENT	CUMULATIVE PERCENT
VLBW	198	1.4	1.4
LBW	959	6.8	8.2
NBW	12975	91.8	100.0
TOTAL	14132	100.0	

TABLE 2d.

DISTRIBUTION OF MOTHER'S ALCOHOL USE:

ALCOHOL USE	FREQUENCY	PERCENT	CUMULATIVE PERCENT
Yes	168	1.2	1.2
No	13964	98.8	100.0
Total	14132	100.0	

TABLE 2e.

DISTRIBUTION OF MOTHER'S TOBACCO USE:

TOBACCO USE	FREQUENCY	PERCENT	CUMULATIVE PERCENT
Smoking	1452	10.3	10.3
No Smoking	12680	89.7	100.0
Total	14132	100.0	

Table 3a presents the trimester in which prenatal care began. About 46.9 % started the prenatal care as recommended i.e. during the first trimester, 35.8% during the second trimester, and 17.3 % during the third trimester.

There are a variety of maternal risk factors for pregnancy. Only the category which indicated presence or absence of any kind of risk factors was reported. Table 3b shows that 28.7% of all cases had some kind of maternal risk factor for the pregnancy .

Table 3c displays the distribution of age in months at infant's death. It was observed that most deaths occurred to infants under one month of age i.e. 55 % of all death were neonates. It was also observed that the first six months of life is very critical to the survival of infants since 95.9 % of the deaths occurred during the first six months of life with only 1.1 % of the total deaths occurring within the second six months. There were 5.8 neonatal deaths per 1000 livebirths and 4.74 postneonatal deaths per 1000 livebirths in Tarrant County during the period from 1991 through 1995. Taken together, Tarrant County, Texas registered an infant mortality rate of 10.5 deaths per 1000 livebirths during the study period.

The following distributions were also observed from the data as percentages of total births to adolescent mothers during the study period: (a) general abnormality, 3.5 % of total births; (b) congenital abnormality, 1.0 % of total births; (c) vaginal delivery, 75.2 % of total births; (d) sex at birth , male, 51.2 % of total births and female, 48.8 % of total births; and (e) birth type, singles, 98.6 % of total births and twins or more, 1.4 % of total births.

TABLE 3a.

DISTRIBUTION OF THE TRIMESTER WHEN PRENATAL CARE BEGAN

MONTH	FREQUENCY	PERCENT	CUMULATIVE PERCENT
FIRST TRIMESTER	6629	46. 9	49.9
SECOND TRIMESTER	5057	35.8	82.7
THIRD TRIMESTER	2446	17.3	100.0
TOTAL	14132	100.0	

TABLE 3b.

DISTRIBUTION OF MATERNAL RISK FACTORS:

RISK FACTORS	FREQUENCY	PERCENT	CUMULATIVE PERCENT
YES	4051	28.7	28.7
NO	10562	74.7	100.0
TOTAL	14132	100.0	

TABLE 3c.

DISTIBUTION OF AGE IN MONTHS AT INFANT'S DEATH:

DEATHS	FREQUENCY	PERCENT	CUMULATIVE PERCENT
NEONATES	82	55.1	55.1
FIRST SIX MONTHS	61	40.9	96.0
LAST SIX MONTHS	6	4.0	100.0
TOTAL	149	100	

The causes of infant death varied from viral diseases to accidental mechanical suffocation and other accidental causes and homicide. There were a total of 149 infant deaths reported of which 18.8% or 28 deaths were due to sudden infant death syndrome (SIDS). The distribution of the major underlying causes of infant deaths were as follows: (a) Sudden infant death syndrome, 18.8 %; (b) other respiratory conditions of newborn, 12.1 %; (c) all other causes 7.4 %; (d) disorder due to low gestational age and low birthweight, 6.7 %; (e) respiratory distress syndrome, 6.0 %; (f) congenital anomalies, 6.0 %; (g) other accidental causes and homicide, 5.4 % and ill-defined perinatal period conditions, 4.0 %.

The results of crosstabulation (Table 4) between birthweight and mother's ethnicity indicate that there were (a) 5.2 VLBW White infants per 1000 live births, 25.5 LBW White infants per 1000 live births, and 398.4 NBW White infants per 1000 live births; (b) 6 VLBW Black infants per 1000 live births, 25.4 LBW Black infants per 1000 live births, and 249.0 NBW Black infants per 1000 live births; and (c) 2.8 VLBW Hispanic infants per 1000 live births, 16.9 LBW Hispanic infants per 1000 live births, and 321.8 NBW Hispanic infants per 1000 live births.

The crosstabulation of birthweight and mother's ethnicity also outlined the differences in birthweight distribution among the three ethnic groups for the entire study period. The following observations were made (Table 4):

Hispanic adolescent mothers had better infant birthweight outcome than White and Black adolescent mothers because of their lower numbers in both VLBW and LBW categories. Black adolescent mothers had similar birthweight outcome to their White counterparts in the LBW weight category.

TABLE 4.

CROSSTABULATION BETWEEN BIRTHWEIGHT AND MOTHER'S ETHNICITY:

a) White adolescent mothers:

	% of total white births	% of all births
VLBW	1.2	0.5
LBW	6.0	2.6
NBW	92.8	39.8
Total	100.0	42.9

b) African American (Black) adolescent mothers:

	% of total Black births	% of all births.
VLBW	2.4	0.6
LBW	10.2	2.5
NBW	87.4	24.9
Total	100.0	24.9

c) Hispanic adolescent mothers:

	% of total Hispanic births	% of all births
VLBW	0.9	0.3
LBW	5.2	1.7
NBW	93.9	30.2
Total	100.0	32.2

In an effort to demonstrate the ethnic differences with respect to gestational age, a crosstabulation among gestational age category, infant birthweight category, and mother's ethnicity was performed (Table 5 a-c):

The intersection of the categories were chosen in calculating the percentage within each ethnic group and for all groups in order to determine if differences existed among the ethnic groups with respect to gestational age and birthweight (Table 5 d-f):

Within each ethnic group, the combination (intersection) of normal birthweight (NBW) and normal gestational age (NGA) had the highest percentage of the number of normal birthweight infants. Most births to adolescent mothers from each ethnic group were normal birthweight and normal gestational age infants. There were 2.1 % White infants who were both low birthweight and preterm, 1.6 for Blacks, and 0.88 for Hispanic infants.

TABLE 5.

CROSSTABULATION BETWEEN GESTATIONAL AGE AND BIRTHWEIGHT

a) White adolescent mothers:

	VLGA	LGA	NGA	Total.
VLBW	32	40	1	73
LBW	6	196	159	361
NBW	60	204	5366	5630
Total	98	440	5526	6064

b) African American (Black) adolescent mothers:

	VLGA	LGA	NGA	Total.
VLBW	37	47	1	85.
LBW	5	180	174	359.
NBW	45	204	2827	3076.
Total	87	431	3002	3520.

c) Hispanic adolescent mothers:

	VLGA	LGA	NGA	Total.
VLBW	14	25	1	239
LBW	2	123	114	426

NBW	60	202	4007	4269
Total	76	350	4122	4548

d) White adolescent mothers:

	% of all White Births	% of AllBirths.
VLBW x VLGA	0.5	0.2.
LBW x LGA	3.2	1.9.
NBW x NGA	88.5	37.9

e) African American (Black) adolescent mothers:

	% of all Black Births	% of all Births
VLBW x VLGA	1.1	0.3
LBW x LGA	5.1	1.3
NBW x NGA	80.3	20.0

f) Hispanic adolescent mothers:

	% of all Hispanic Births	% of all Births.
VLBW x VLGA	0.3	0.1
LBW x LGA	2.7	0.87
NBW x NGA	88.1	28.4

The data from this study for the dependent variables, infant birthweight and infant mortality were analyzed using the method of backward stepwise logistic regression with a simple contrast. The following variables went into the model as categorical variables:

a) Mother's Age Category (19 years old as the reference):
   - Under 14 years old.
   - 15 years old.
   - 16 years old.
   - 17 years old.
   - 18 years old.
   - 19 years old.

b) Mother's Ethnicity (White as the reference):
   - White.
   - Black.
   - Hispanic.

c) Number of Prenatal Visits (11 to 20 visits as the reference):
   - 11 to 20 visits.
   - 1 to 10 visits.

d) Gestational Age (NGA as reference):
   - Very Low Gestational Age (VLGA).
   - Low Gestational Age (LGA).

- Normal Gestational Age (NGA).

e) Number of Cigarettes Used per Day (No Smoking as reference):

- No Smoking.
- 1 to 10 Smoked.
- 11 and Over.

f) Trimester When Prenatal Care Began (FT as reference):

- First Trimester (FT).
- Second Trimester (ST).
- Third Trimester (TT).

g) Mother's Weight Gain (11 and Over as reference):

- 0 to 30 lbs. Gain.
- 11 and Over.
- No Weight Gain.

h) Mother's Education (High School and Above as reference):

- High School and Above.
- Middle School and Below.

i) Marital Status (Married as reference):

- Married.
- Unmarried.

j) Parity (Yes as reference):

- Yes.
- No.

k) Mother's Alcohol Use (NO as reference):

- Yes.
- No.

l) Method of Delivery (Yes as reference):

- Yes.
- No.

m) Tobacco Use (No Smoking):

- Smoking.
- No Smoking.

n) Maternal Risk Factors(No as reference):

- Yes.
- No.

o) General Abnormality (No as reference):

- Yes.
- No.

p) Father's Education (High School and above as reference):

- High School and Above.
- Middle School and Below.

q) Birth Type (Singles as reference):

- Singles.
- Twins or more.

r) Congenital Abnormality (No as reference):

- Yes.
- No.

s) Infant Birth Weight (NBW as reference):

- Very Low Birthweight (VLBW).
- Low Birthweight (LBW).
- Normal Birthweight (NBW).

t) Sex at Birth (Female as reference):

- Male.
- Female.

The process of backward stepwise logistic regression analysis for infant birthweight outcome, selected the following variables that were included in the model for the estimation of the parameters: mother's ethnicity, mother's weight gain during pregnancy, parity at birth, birth type (twins or singles), sex at birth, number of cigarettes used per day, father's education, gestational age, tobacco use, and method of delivery (vaginal or caesarian section).

The variables that were not selected into the model included the following: mother's age, Mother's alcohol use, marital status, number of prenatal visits, month at which prenatal care began, mother's education, maternal risk factors, general abnormality, and congenital abnormality.

Backward logistic regression also selected the following variables to be included in predicting the infant mortality outcome: the number of prenatal visits, the birth type (single or twins), general forms of infant abnormality, and congenital abnormality. The variables that were not selected into the model for the analysis included the following: infant birthweight; type of delivery; mother's alcohol use; mother's age; mother's education; marital status; trimester when prenatal care began; mother's ethnicity; father's education; maternal risk factors; gestational age, tobacco use, and parity.

Table 6a and 6b display the results of logistic regression analysis and a 95 % confidence interval of the odds ratio for each predictor variable for the outcome, infant birthweight. The following variables were found to be significant predictors of infant birthweight: mother's ethnicity, mother's weight gain during pregnancy, gestational age, father's education, sex at birth, type of birth, parity, type of delivery, tobacco use per day and number of

cigarettes used per day.

Mother's ethnicity was found to be a strong predictor of infant birthweight and being a Hispanic mother was protective implying that there was a very high likelihood that a Hispanic mother would not give birth to a low birthweight infant. This finding is supported by data displayed in Table 4 in which Hispanic adolescent mothers had a combined very low birthweight (VLBW) and low birthweight (LBW) infants of 2.0 % of all births compared to both White and Black mothers with 3.1 % each. There was no statistical difference between Blacks and White mothers but Hispanic mothers differed with both groups.

Gestational age was found to be a very strong predictor of infant birthweight. And in this category, all the three groups were statistically different. Data in Table 5 show that Hispanic mothers had the lowest percentage of the combined VLBW x VLGA and LBW x LGA of only 0.88 % for all births as compared to White mothers, 2.1 % and Black mothers, 1.6 %.

Cigarette smoking was a significant predictor of infant birthweight, but smoking less than 11 cigarettes per day had a

similar effect to not smoking at all and was indeed found to be protective. Giving birth to twins was and demonstrated to be a good predictor for low birthweight infant. Male infant was also shown to predict for low birthweight infants. Whether or not an adolescent had prior birth experience was determined to be a predictor for low birthweight infants, with those who had no previous birth experience more likely to give birth to LBW and VLBW infants.

The results of logistic regression analysis in table 6a indicated that caesarian section birth was a predictor for LBW infant. The number of prenatal visits was found to be a very strong predictor of infant mortality. The results from regression analysis demonstrated that the more the visits the better the likelihood of preventing infant death (Table 7a and 7b). Giving birth to more than one infant at a time was also found to strongly predict for infant mortality.

TABLE 6a.

RESULTS OF LOGISTIC REGRESSION FOR INFANT BIRTHWEIGHT:

VARIABLE	p-value (alpha = 0.05)
Mother's Ethnicity – Overall	0.0000*
Mother's Ethnicity – Black	0.0000*
Mother's Ethnicity – Hispanic	0.0336*
Mother's Weight Gain (0 to 30 lbs.)	0.0000*
Parity (No)	0.0055*
Sex at Birth (Male)	0.0023
Birth Type (Twins or More)	0.0000*
Number of Cigarettes Used per Day - Overall	0.0351*
Number of Cigarettes Used per Day (1 TO 10)	0.2170
Number of Cigarettes Used per day (11 and More)	0.0266*
Father's Education (Middle School or Lower)	0.0234*
Gestational Age Category – Overall	0.0000*
VLGA	0.0000*
LGA	0.0000*
Tobacco Use (Smoking)	0.0000*
Method of Delivery (Ceasarian)	0.0012*

Note. * Significant predictor at $p < 0.05$.

TABLE 6b.

ODDS RATIO AND 95 % CONFIDENCE INTERVAL FOR INFANT BIRTHWEIGHT

VARIABLE	EXP(B)	95% CI FOR EXP (B)	
		LOWER	UPPER
Mother's Ethnicity- Black	1.7115	1.4206	2.0619
Mother's Ethnicity- Hispanic	0.8135	0.6725	0.9841
Mother's Weight Gain (0 to 30 lbs.)	2.4527	2.0581	2.9229
Parity (No)	1.2633	1.0712	1.4898
Sex at Birth (Male)	0.7991	0.6919	0.9228
Birth Type (Twins or More)	13.2811	8.9391	19.7320
Number of Cigarettes Used per Day (1 to 10)	0.8237	0.6054	1.1207
Number of Cigarettes Used per day (11 and More)	1.5830	1.05446	2.3761
Father's Education (Middle School)	1.1954	1.0244	1.3949
Gestational Age (VLGA)	11.6641	8.7791	15.4972
Gestational Age (LGA)	22.9284	19.6480	26.7567
Tobacco Use (Smoking)	1.8261	1.4490	2.3015
Type of Delivery (Csection)	1.2947	1.1068	1.5144

TABLE 7a.

RESULTS OF LOGISTIC REGRESSION FOR INFANT MORTALITY

VARIABLE	p-value (alpha = 0.05)
Number of Prenatal Visits (Overall)	0.0000*
Number of Prenatal Visits (1 to 10)	0.0010*
Number of Prenatal Visits (0 visits)	0.0000*
Birth Type (Twins or More)	0.0105*
General Abnormality (Yes)	0.0000*
Congenital Abnormality (Yes)	0.4713

Note. * Significant predictor at $p < 0.05$.

TABLE 7b.

ODDS RATIO AND A 95 % CONFIDENCE INTERVAL FOR INFANT MORTALITY

VARIABLE	EXP (B)	95% CI FOR EXP (B)	
		LOWER	UPPER
Number of Prenatal Visits(1 to10)	2.1586	1.3625	3.4198
Number of Prenatal visits(0visits)	4.7712	2.7595	8.2495
Birth Type (Twins or More)	3.0763	1.3015	7.2714
General Abnormality (Yes)	10.4075	7.1460	15.1575
Congenital Abnormality	0.0265	0.0000	516.4004

CHAPTER V

DISCUSSION AND CONCLUSIONS

The results of this study are very encouraging since very few teenagers under 14 years old are having babies. Of the total number of adolescents who gave birth, 50.2% were married compared with 49.8% who were not. Overall, NBW births were 91.8% across all age categories. Only 1.4% of total births occurred in the VLBW category. The implication of this finding is that the risk of low birthweight and very low birthweight is minimal in Tarrant County, Texas – only about 8.2% of the total births. The finding is consistent with earlier studies which reported that the majority of births to teenagers are concentrated in the later years of adolesence and that the rates for 18-19 year-olds are more than double those for 15-17 year-olds and for those under 15 years of age, the numbers are too low to provide any meaningful statistical significance (Rosenberg et al., 1996 and Ventura et al., 1997).

Birthweight is regarded as the single most useful health indicator. As an outcome indicator, birthweight reflects the health experience of the pregnancy and as a risk indicator, it predicts infant morbidity and mortality. From this study only 8.2% of the total births were very low or low birthweight.

Data obtained from Table 4 indicate that Hispanics had the best overall infant birthweight outcome with only 2.0 % of all births for both VLBW and LBW. Taken together, there were 198 births of very low birth weight, (1.4 %) 959 (6.8%) low birth weight, and 12975(91.8%) of normal birth weight. Only 9.2% of the total births were preterm and most of those births were found in the 18 through 19 age group.

Table 1d outlines the frequency of mother's education. 82.2% of the adolescents who gave birth during the period between 1991 through 1995 had a high school education. The father's age ranged from 13 through 68 years old. 62.5% of the infants were fathered by those aged between 20 and 30 years old. This result is consistent with other studies that have concluded that older men with more than high school age account for about 70% of all births. Table 1e

shows the educational achievements of the fathers. Most fathers (60%) had only elementary school education compared to the mothers whom the majority have high school education or were enrolled in high school.

The majority of adolescents who gave birth during the study period (74.6%) had not given birth previously. Whereas 25.4% of the total number of births were those from women who had been pregnant before. There were 3.1% terminated pregnancies or spontaneous abortions. Prenatal care should begin within the first trimester. From all the births during the study period, 6.6% of all the mothers did not attend prenatal care at all: 47.6% began prenatal care within the first trimester while 36.3% started prenatal care during the second trimester. About 9.4% began their prenatal care in the third trimester, slightly more than those who did not attend any prenatal care at all.

Differences in smoking rates among women vary depending on race, education and income. It has been reported that high prevalence rates exist among women with a high school education. In general, the percentage of pregnant women who smoke ranges from 20% to

50% with higher rates found in public health maternity care programs (170). From the study data, about 10.3% of pregnant adolescents smoked a proportion much smaller than the national trend of 20-50%. Alm et al. (1995) has reported that smoking is an independent risk factor for sudden infant death syndrome (SIDS).

Substance abuse during pregnancy has continued to be a widespread health problem. Estimates of substance abuse among pregnant adolescents range from 11% to as high as 52% (Cornelius et al., 1993) which is similar for non-pregnant adolescent females. Results indicate that only 3.9% of the cases smoked during pregnancy. This figure is far less than the national range of 11% to 52%.

Congenital abnormality rates were much lower in this study population, about 1.1% of total births, where as general non congenital abnormality was much higher, about 3.9% for all groups.

The significance of infant mortality as an important indicator of our nations health status and well-being has been well documented. The Surgeon General's national health objectives for the year 2000 include the reduction of the overall infant mortality rate to under 7

per 1000 live births and reducing the infant mortality rate for African Americans to under 11 per 1000. But the long-term trends in US infant mortality have not been uniform for various socioeconomic and demographic sub-groups of the population and causes of infant death (Kleinman, Fingerhut, and Prager, 1991).

There was an overall infant deaths across all the ethnic groups investigated of 10.5 per 1000 live births. This figure is still much higher than the rate specified in the Surgeon General's national health objectives for the year 2000 (Healthy People 2000).

The rate for neonates, namely those under one month of life was 5.0 per 1000 live births. The rate for stillborn or fetal deaths for the County was 0.7 per 1000 live births or 0.07% of the total live births. The two figures are very low overall.

The rate for neonatal deaths for whites during the period, was 2.3 per 1000 live births, Blacks, 1.56 per 1000 live births, and Hispanic, 1.9 per 1000 live births. The neonatal death rate was lower for blacks than for whites and Hispanics. The rate of death for VLBW was 0.2 per 1000; LBW, 0.35 per 1000; and NBW, 5.2 per 1000. The results here contradict many previous studies which have reported

that very low birth weights and low birth weights are predictors of infant mortality and is similar to the conclusion from the logistic regression analysis on infant mortality which found no effect of birthweight on infant mortality. The data demonstrate that NBW had the highest rate of infant mortality.

The causes of infant deaths varied and included viral diseases, nervous systems diseases, diseases of respiratory systems, colitis, enteritis, gastritis, digestive system congenital abnormalities and all forms of congenital abnormalities and sudden infant death syndrome among others.

The infant mortality rate in the state of Texas has declined, from 8.0 per 1000 live births in 1990 to 6.5 per 1000 live births. The decline followed the following trend: from 7.7 per 1000 live births in 1991, 7.7 per 1000 live births in 1992, 7.5 per 1000 live births in 1993, 7.1 per 1000 live births in 1994, and 6.5 per 1000 live births in 1995.

The state figures represent deaths and births from the entire groups of women in birth giving populations. In Tarrant County the births and deaths were limited to adolescent mothers under 20

years old who lived in the County.

For the entire period of study there were only 10 fetal deaths (stillborn) representing a rate of 0.7 per 1000 live births. Because of the small number of deaths in a five-year period, fetal deaths based on race was not calculated. The rate for neonatal deaths was 5.8 per 1000 live births while the post-neonatal death rate was 4.7 per 1000 live births. But the combined infant mortality rate for the county during this entire period was 10.5 per 1000 live births compared to the state average for the same period under reference of 7.3 per 1000 live births. The state rate did not factor in age as is the case with the county rate and so direct comparison is not possible.

The overall infant mortality during the study period was 10.5 per 1000 live births. When adjusted for mother's ethnicity, White mothers had a rate of 4.5 per 1000 live births, Black mothers, 2.8 per 1000 live births, and Hispanic mothers, 3.2 per 1000 live births. White mothers had the highest infant rate followed by Hispanics at 3.2 and Black mothers had the lowest infant mortality rate of 2.8 per 1000 births. Black mothers did not experience any stillborn

across all age groups while White mothers and Hispanics had equal number of stillborns during the study period. Black mothers had the least number of neonatal deaths (1.5 per 1000 live births), followed by Hispanic mothers (1.9 per 1000 live births), and lastly, white mothers with 2.3 per 1000 live births. This finding contradicts the conclusion made by Din-Dziethham and Picciotto (1998) in which they reported that African Americans had a higher risk of infant death than Whites and Kleinman et al. (1991) who also reported that the rates for infant mortality and low birthweight are twice the those for Whites.

No difference was found between White and Black adolescent mothers who gave birth to VLBW and LBW. Each group stood at 3 % for VLBW and LBW when the total number of births were considered. Hispanic mothers had a combined total of 2.0 %. Historically, African American adolescent mothers have been known to give birth to disproportionately higher numbers of LBW and VLBW babies. The findings in this study contradict that belief and equated Black with White adolescent mothers. Hispanic mothers had the best infant birthweight outcomes when the three groups were compared.

The mother's age category had no significant effect on birthweight. The young adolescent mothers under 14 had similar outcomes as their older colleages. There was also no effect of birthweight on infant mortality. The finding is not consistent with studies reported earlier in which low birthweight has been found to be a risk factor for infant mortality (Msall et al., 1993).

The conclusions from this study are:

- Age of the adolescent mother is not an important factor in predicting adverse birth outcomes
- Age of the mother has no effect on infant mortality.
- Most births to adolescent mothers are contracted in the 18 and 19 age categories And therefore adolescent pregnancy is not a problem in Tarrant County, Texas.
- Ethnicity is a very strong predictor of infant birthweight to adolescent mothers and the results demonstrate that Hispanic adolescent mothers had the best infant birthweight and mortality outcomes and that very little difference existed between White and Black adolescent mothers.

This study has contradicted many studies quoted earlier in the review of litrature in which adolescent pregnancy has been described as a major problem facing society and that Whites have traditionally done better than Blacks and Hispanics. The results demonstrated that Hispanic adolescent mothers had the best outcomes when infant birthweight was considered whereas African Americans had the best outcome when infant mortality was considered. African American and White adolescent mothers had comparable infant birthweight outcomes. Since the study was conducted in one location, and for only a five-year period, more studies are needed in different regions of the country and for longer periods to validate some of the conclusions made from this study.

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