SPATIAL ANALYSIS OF TEEN BIRTHS IN NORTH CENTRAL TEXAS

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The United States has the highest teen birth rate among western industrialized countries and the highest levels of pregnancy among adolescents (Alan Guttmacher Institute, 1994). While the rate of teen births is high throughout the country, considerable variations exist between and within regions. Texas is one of the 5 leading states with the highest teen birth rates to mothers less than 18 years of age. This research provides a detailed analysis of births to mothers aged between 10 and 19 years in North Central Texas counties. Due to the modifiable area unit problem and to provide a finer geographical scale of analysis, teen births in Dallas County zip codes were examined as a special case study. Statistical and Geographic Information System (GIS) analysis reveal that race/ethnicity, education and income are significant factors in teen births in the region. Single parent households and receipt of public assistance were not statistically significant. Suggestions for reducing vulnerability to teen births are presented.

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CHAPTER 1

INTRODUCTION

The United States has the highest teen birth rate among western industrialized countries and the highest levels of pregnancy among adolescents (Alan Guttmacher Institute, 1994). Persistent high rates of teen births in the US have become a source of tremendous public concern after a decline between the late 1960's and 1980's. Every year, about one million infants are born to teen parents and about three million children under six years are being raised by teen parents or in alternative settings such as foster care or extended family systems (Community Outreach Health Information Systems, 1998). According to the U.S. Department of Health, adolescent child bearing in the United States has been a problem with substantial costs to mothers, children and the whole society. The estimated annual cost incurred by the government to aid teen mothers is $7 billion.

With about 74.5 live births per 1,000 teens, Texas is among the five leading states with high adolescent births in the United States. In 1998, 6.4 percent of all Texas births were to mothers 17 years of age or younger, and 9.8 percent to mothers 18 to 19 years old. About 5.6% of all mothers in the North Central Texas region are teen mothers under 18 years (Texas Department of Health, 1998). The increasing number of teen births and the associated costs of caring for a young dependent population can have serious economic and social repercussions for Texas. This research examines the geography of teen birth rates across North Central Texas region and the related explanatory factors.

The specific objectives are:

1. To examine the geography of teen birth rates in North Central Texas counties;
2. To analyze the geographical distribution of teen births in one of the counties with a high teen birth rate and it's relationship to social and economic indicators such as race/ethnicity, income levels and education using GIS and statistical analysis.
3. Suggest strategies for teen pregnancy and birth prevention in high-risk communities.

Teen Births in U.S. and North Central Texas (NCT)

Although the level of sexual activity among teens living in the U.S. is similar to that of teens living in other developed countries such as France, Great Britain, Sweden, and Canada, teen birth rate for the U.S is twice as high as it is for England, Wales and Canada and nine times that for the Netherlands or Japan (Alan Guttsmacher Institute 1994). In the USA about one million teenagers become pregnant every year (COHIS, 1998).

Nevertheless, contrary to what has been suggested, teen birth rate in the US declined from 1960 through the early parts of the 1980s. The rate of decrease was more pronounced for African Americans than Whites. Since 1984, however, the rate of teen birth has risen steadily for both black and white adolescents, with most of the increase occurring between 1988 and 1990. In 1989, 1 in 10 women between 15-19 years of age became pregnant and 1 in 20 had a birth, a rate that substantially exceeded that of every industrialized country. The illegitimacy ratio, the proportion of all births that are to

unmarried women, rose from well under 1:3 for teens in 1970 to nearly 2:3 in 1989 (National Center for Health Statistics, 1991). The birth rate in 1998 was about 59.9 births per 1,000 for 15-19-year old females.

Several researchers attribute the high levels of teen births to the program of Aid to Families with Dependant Children (AFDC), which provides 'Welfare' for teen mothers (Elwood and Bane, 1985). In 1992, 86% of AFDC households received food stamps and Medicaid covered 96% of these households. The government caters for part of the healthcare needs and food expenses of the teen mother and her child through these programs. Family members may also provide some assistance or support. Thus, teen mothers do not bear the whole responsibility of raising a child by themselves.

Considerable disparities exist in the geographical distribution of teen births in NCT. The urban areas of Dallas and Tarrant counties had the highest number of teen births for 1998, 6,161 and 3,152 respectively (Texas Department of Health, 1999). Dallas County accounts for more than half the number of teen births in the North Central Texas region. Somervell, Rockwall, Erath, Hood and Palo Pinto counties have the lowest number of teen births with Somervell accounting for about 0.1% of the entire number of teen births. The number of teen births appears to be high and more concentrated in the more urbanized regions and less in the rural areas. Demographers and planners anticipate a dramatic growth in the young population from teen births in the next decade in North Central Texas as these children of teen mothers become old (TDH, 1997). Such growth may produce an increase in the dependency ratio and pressure on existing infrastructure.

CHAPTER 2

DETERMINANTS OF TEEN BIRTHS

For adolescent women, living in female-headed households who face economic and social uncertainties daily, unemployment and curtailed educational opportunities are common. Teens living in more advantaged communities have access to social and economic resources necessary for education, health care (pregnancy prevention/abortion) and are found to be more focused, delay pregnancy or birth, have higher education, get careers and earn income. They are likely to view early parenthood as a failure on their part and not a mark of adult status – an obstacle to attaining desired roles and statuses (Burton, 1990). 'Economically and socially disadvantaged' may include Blacks, Hispanics and Whites.

Race/Ethnicity

Of all births in the region to teens between the age's 15-19 years, 19.7% are by Hispanics, 28.8% by Blacks and 10.9% Whites. (Texas Department of Health, 1998) Even though coital frequency is found among all adolescents it is more frequent among minority groups who are socially and economically disadvantaged. Black and

Hispanic teens were twice as likely as Whites to get pregnant. Often teen pregnancy is cyclical, from mother to child (Weeks, 1996).

Early childbearing and its proximate behavioral determinants are viewed as an "alternate life course strategy" that has developed in response to the social, economic and cultural constraints facing minority teens in poverty stricken communities (Burton 1990). Underlying this formulation of adolescent fertility is the understanding that the worldview life course trajectories vary across social contexts. Teens in depressed communities may have a markedly different outlook and expectation for their educational attainments, work, and family life than do teens living in economically and socially advantaged communities.

Income

Poverty is three times more common among Blacks than Whites and less common among people with more education. Black teens are disproportionately poor and also display higher rates of teen birth compared to their white counterparts (Moore, Simms and Betsy, 1986). A 1988 nationwide survey in the U.S. revealed that 20.8% of High School graduates were poor. Of those who completed one or more years of college education only 3.5% were poor. Poor teens have poorer healthcare services and yet are likely to have more teen births than teens from affluent homes. Teens from low-income families are more likely to become pregnant from intercourse because of a lack of exposure to contraceptives and sex education.

Studies show a significant association exists between low-income and early childbearing (Hayes, 1987). Income of women who had early childbirth and did not further their education is very low. It has been suggested that a reduction in the rate of adolescent teen pregnancy would lead to a subsequent decrease in socially disadvantage teens especially for those who grew up in poverty. Delayed birth has the potential of strategically making way for higher level of education, increase in job prospects and improving social status.

Education

Mothers' educational background and social status is very crucial in decisions that teens make on sex and pregnancy. Teens of more educated mothers are more concerned with early child bearing than teens whose mothers have low educational status. Adolescents whose parents have low educational status are more likely to get pregnant (Henly, 1993).

Pregnancy among adolescents often results in abrupt changes in the their life style (anomie) and makes them less likely to continue their education, get employed, earn high wages, and achieve a higher social status. Teenage parenting often averts or postpones education for both girls and boys. Seven out of ten school mothers may eventually complete high school or receive a GED (Alan Guttsmacher Institute, 1994). Adult mothers are more likely to have finished high school, attend college and be gainfully employed.

Moreover, it has been observed that Blacks do not get similar returns for their education as their White counterparts and as a result there is no real motivation for Black teens to pursue their education further. Even when in similar occupations with Whites, Blacks do not receive similar incomes (Dodson, 1988).

Neighborhood Composition

Neighborhood characteristics engender a social context, which influences individual perceptions, attitudes, and values that ultimately guide behavior (Brewster et al. 1993). Variations in the patterns of teen birth distributions in different locations are due to neighborhood effects, which have a direct link to income levels, housing type and provision of health care services.

Some recent theories of persistent urban poverty are based on family background and neighborhood factors. By family background, variables such as race/ethnicity, income and level of education come into play. Neighborhood composition as well as residential location is a well-established indicator of people's social standing in society (Laumann, Siegel and Hodge, 1970). The model of place stratification according to Logan and Molotch (1987) lays emphasis on structural sources of inequality. Stratification of places is seen as a means by which the more advantaged groups seek to preserve social distance from the disadvantaged. It allows one to study the sorting processes that put individuals in specific locations and the impact of location on their residents and expectations of life. Residential location may thus be a very important factor in teen pregnancy as well as access to healthcare services. In fact, residential

location may be conceptualized as a group level attainment process, which varies and works differently for persons of different race/ethnic and income backgrounds. Higher income earners are able to live in better communities and have access to health insurance and better chances of adequate healthcare (Logan and Alba, 1993) with a lower risk of teen pregnancy.

Contraceptive Method Choices

Few studies have examined the socioeconomic determinants of patterns of teenage contraceptive method use. However a number of researchers have examined the correlates of contraceptive use at first intercourse to social, economic and educational standing. Teens who initiate sex at a later age describes it as "planned" and come from a higher status background with both parents living together (Hogan, Astone and Kitagawa, 1985). However, these studies have been criticized as having a limited view on teen contraceptive use. For example they focused almost entirely on the first sexual act, when in reality contraceptive decision changes progressively over stages of a woman's sexual life. The studies further ignore methods of contraception and focus on whether or not contraceptives were used. Clearly, social and economic factors determine use and or what method is used.

To understand teen birth fully, one needs to understand teen contraceptive methods used by teens. Contraceptive use is complex due to variations in teen's contraceptive needs and motivation. What they are preventing, desirability and effectiveness of methods is also a factor. Furthermore, teens that did not use a method of contraception at first sex have a lower chance of using it thereafter. For teens

contraception is practiced sporadically or not at all. It is not clear how many teens use contraceptives.

Contraceptive methods frequently used by teens are the pill (44%), followed by the condom (38%). About 10% rely on injectibles, 3% implants with parental consent and 4% withdrawal method (National Survey of Family Growth, 1995). Withdrawal rhythm method requires sophisticated knowledge of the reproductive anatomy. Because of inexperience many teens do not understand the importance of combining contraceptives with this method or feel uncomfortable discussing contraception with their partners (Thompson and Spanier 1978).

White teens more than Blacks and Hispanics were found to be using condoms/pills (Kahn, Rindfuss and Guilkey, 1990). In communities where early childbirth is frowned upon, teens are more likely to choose a condom. Also these teens are selective in choosing male partners who will also practice “safe sex”. Teens are too embarrassed or lack the financial ability to obtain over the counter contraceptives from pharmacies or use effective methods such as the pill or intrauterine device (IUD), which requires parental consent. Contraceptive use may reflect economic differences in the availability of family planning services.

Legal issues affecting teen births

Economic and legal issues that affect access to abortion may also influence the geography of teen births. For example, patterns of clinic and hospital visits reflect differences in access and affordability of family planning services and abortion

particularly for Blacks and Hispanics. According to Hayes (1987), adolescent childbearing is a phenomenon deeply rooted in socioeconomic disadvantage and although reproductive healthcare facilities may be physically available to all, economic and social constraints limit the maximum utilization of these facilities. Thus, economic disadvantage limits access to abortion services and promotes teen births. Most adolescents stand the risk of getting pregnant and certain socioeconomic conditions may predispose some groups to teen births than others.

Furthermore, legal issues' pertaining to teens and teen births has made it difficult to gain access to some contraceptives and abortions. Specifically, three laws affect teen births in North Central Texas — Title X, Title XIX, and Notice of Abortion under the Family code.

Under Title X (Government provision for Family Planning Services), sexually active adolescents who seek birth control using Title X family planning services will have to seek their parents' consent, confidentiality therefore is compromised. Some government officials are of the view that access to confidential family services by teens alone is essential to maintain some form of privacy for teens. Federal and State lawmakers have long recognized that while parental involvement is desirable, confidentiality can be crucial in encouraging young adults to address unplanned pregnancy and contraceptives.

Title XIX (MEDICAID**)** is a federal-state matching program in which both the federal and state governments must contribute a specified percentage of total expenditure. Medicaid pays medical bills for low-income persons, prenatal and delivery services for

certain pregnant women who have no other way to pay for health care. Texas began participating in Medicaid in September 1967. Texas ranked 3rd among states on total Medicaid spending in 1996, and covered nearly 2.5 million people in 1997. Medicaid paid for 155,892 deliveries in Texas, at a total cost of $503 million (1995). Approximately 26.1% of these deliveries were to teen mothers and $129 million was spent on deliveries to teens (Texas Department of Health). For Black and Hispanic poor in deprived communities with limited access to contraceptive and abortion services, long waits for Medicaid approval may come too late.

Under the Notice of Abortion and Family Code in Texas, a physician may not perform an abortion on a pregnant minor unless the physician gives at least 48 hours constructive notice, in person, by telephone, by certified mail, restricted delivery sent to the last known address, to the person to whom notice may be given — a parent, a guardian, a court-appointed guardian, or a judge. Moreover, abortion is illegal unless the unborn child is a threat to the mother's health or the child is malformed. A physician who intentionally performs an abortion on a pregnant minor in violation of this section commits an offense, which is punishable by a fine not to exceed $10,000. In some instances the Texas State Board of Medical Examiners may revoke the license of the physician. A pregnant minor who wishes to have an abortion without notification to one of her parents, or her guardian may file an application for a court order authorizing the minor to consent to the performance of an abortion without notification to either of her parents or guardian. (http://www.tdh.state.tx.us/bvs/abortion/abortion.htm). These laws have compelled most physicians to approach abortion services for minors with great

caution. Teens have to seek the concern of their parents or legal guardian before an abortion, a requirement which clearly this limits access to abortion.

Summary

Certain socioeconomic conditions predisposes some teens to teen birth than others. It is widely believe adolescent childbearing is a phenomena deeply rooted in socioeconomic disadvantage. For example economic and social constraints may limit the maximum utilization teen birth prevention services and therefore the high rate of teen birth in low-income communities.

CONCEPTUAL FRAMEWORK

Assessing the Concept of Vulnerability to teen births

What makes teenagers vulnerable to teen pregnancy? What determinants put some groups of teenagers at higher risk than others? To address these questions, a vulnerability conceptual framework is adopted in this research (Mann, Tarantola and Netter, 1992). While teen birth is generally high in the U.S, it varies between social groups and economic regions. A complete appreciation of the current and future vulnerability of teens to teen births in modern society is necessary to develop preventive strategies at the individual and societal levels. Oppong (1998) defines vulnerability as being at risk physically, psychologically, economically and socially in terms of health. Adverse economic circumstances such as low income and hunger may drive teens to risky sexual activities aimed at giving them both financial and emotional comfort. Family background is posited to operate in a similar manner. Increased awareness of linkages between

situations at home (drugs, alcoholism and divorce/separation) and teen problems has led researchers to attribute early childbearing to the breakdown of family systems. This may lead adolescents to 'seek' other 'love objects' to compensate for the lack of attention and nurture (Fox, 1980). The love object may be a conceived child or a father figure in a relationship. Geographic location of such vulnerable groups may suggest the pattern of distribution of teen births across a region. Three main contexts of teen's vulnerability to

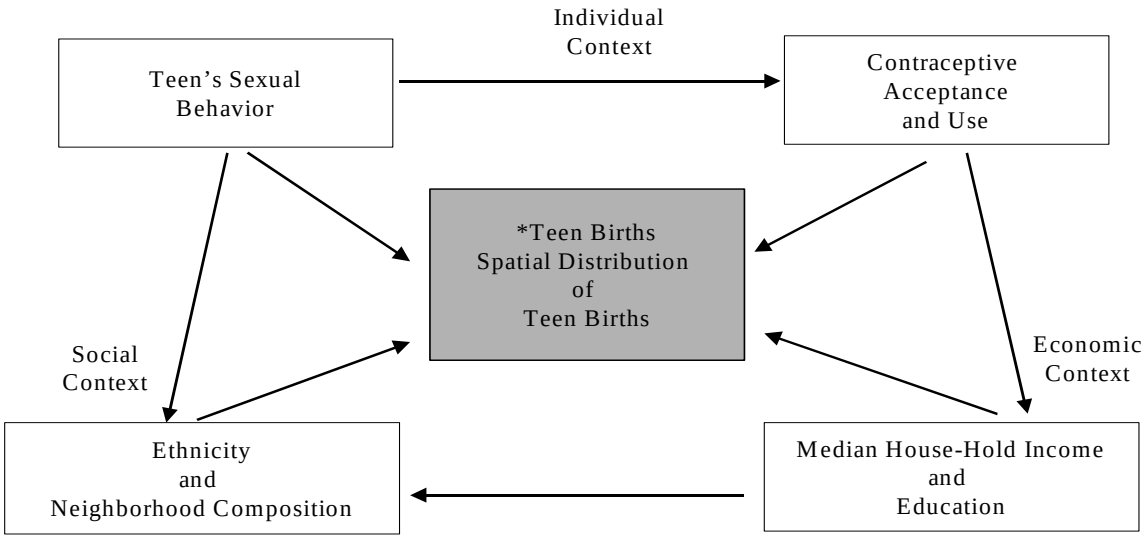

Figure 1. A Vulnerability Approach to Teen Births

teen birth are discussed.

Figure 1 summarizes the relationship between the spatial distribution of teen births and teen sexual behavior, contraceptive acceptance and use, income and race/ethnicity. Individual, social and economic constraints may influence teen's behavior negatively or positively.

Individual Context

Minimum vulnerability exists when the teen abstains from sex, practices non-penetrative sex throughout their teen-age years or is sexually active while using some form of reliable contraceptives to prevent pregnancy. Vulnerability to teen birth increases as a teen who has never been pregnant becomes sexually active with a male partner(s) and does not adhere to safer sex practices or contraceptive use. Thus every teen who is not pregnant or has not had a birth has a potential degree of vulnerability to teen birth. Structural determinants in society produce challenges to the teens personal values, which may enable her to sustain the minimum level of vulnerability or not.

Social Context

Minimum vulnerability to teen birth occurs when communities recognize teen birth as a problem or risk, and provide comprehensive, effective contraceptive method choices and encourage acceptable societal goals such as higher education for teens. Vulnerability increases when communities do not recognize or accept teen birth as a problem or risk, when teens do not have societal support, communities are not willing to modify unacceptable peer affiliations, and do not encourage higher education among teens. Teens who have not yet had a birth are all vulnerable to teen births. Teens who have had a birth have had an impact on communities, often times negatively.

Neighborhood composition remains one of the most important factors in this context. Research suggests that in low-income/education Black and Hispanic neighborhoods teen pregnancy is more tolerated and accepted. In some of these

predominantly minority communities there is a belief in early childbirth for health and socialization purposes (Geronimus, 1991), as reflected in the old adage, “growing up with your children and living to see your grandchildren grow”. Teen birth becomes almost cyclical, following the order of grandmother, mother, teen and future generations. It is a vicious cycle and deeply rooted in their beliefs and practices and path to adulthood. Parents and grandparents help in the upbringing of the child (Wilson, 1987). As a result of this attitude, the opportunity cost of having early birth and having to drop out of school is often over looked by the teen.

On the contrary in societies or neighborhoods where teen birth is frowned upon and considered a failure on the part of both the parent and the teen, teen birth is minimum. Teens are expected to follow the trajectory of life as embedded in the status quo of that community, for example at least finish the basic education, and be gainfully employment, before having children. The opportunity cost of having to drop out of school, having an illegitimate child and facing the reproach of their parents is often considered in the teen’s sexual behavior and contraceptive method choices or termination of pregnancy.

It is therefore widely believed that teen’s individual sexual behavior and attitude towards early births is a reflection of the social and cultural dimension in which they live. Societal norms and perceptions, religiosity and neighborhood composition infuse meaning into behavior and influence it negatively or positively. The members of ones immediate surrounding are the most influential. It is those that the individual belongs to and identifies with and therefore emulates their way of life.

Economic Context

According to vulnerability theory, adverse economic circumstances do not affect social groups evenly. In the U.S income disparities are widespread and low incomes may be more common in single parent, female-headed households. Teens from low-income communities with high unemployment may be more vulnerable to teen pregnancy and births because their parents may stay out late to work for the upkeep of the family or may be too engrossed in their own economic woes to care for their young adults.

Teen births may lead to a higher school drop out rate and subsequent unemployment. Unemployment produces poverty and economic strain on the household, which puts unnecessary economic and emotional pressure on teens. Formal education is an important factor in achieving certain roles and statuses in modern society. Mother's education has a far-reaching effect on the upbringing of the child. Teens from families with high educational background are more likely to be living in high-income neighborhoods as well as having both parents at home and working. Teens are often provided with more knowledge and opportunity of pregnancy prevention, encouraged to go to school, finish college education and be in good paying jobs.

Proceeding from the conceptual framework, the dependent variable is teen births defined to include sexually active females in the region between the ages of 10-19 years who have had at least one birth. The independent variables are income (median household and per capita income), race/ethnicity (percent Blacks, percent Whites, percent Hispanics), education (percent less than 9^{th} grade), percent male-headed household, percent female-headed household and percent public assisted households.

HYPOTHESES

Five main hypotheses are the focus of this study.

1. Teen birth rate is related to low economic status. Poorer communities will have higher teen birth rates.
2. Teen births occur more frequently in communities with low educational attainment.
3. Teen births are more frequent in single-headed households with teens.
4. Teen births are more common in areas with high concentration of ethnic minorities.
5. Teen birth rates are higher in rural areas than urban areas due to educational and economic differences.

OPERATIONAL DEFINITION OF TERMS

Teens - The term ‘teen’ in this research refers to all women between the ages 12-19. Ten to twelve year old females are included in this research because more and more children are becoming increasingly sexually active leading to an increase in reported births. This makes their inclusion important. Females aged between 18 and 19 years are legally considered as adults but are still young in that, most are still emotionally and financially immature. Most births that occur in this age group are by single parents (Alan Guttsmacher Institute, 1994). Adolescent, teenage and youth refer to the same group of persons.

Race - Race is defined as a cultural construction of identity based on a set of descriptors used by society. Race is, not conceived here as an empirical, social or physical reality, but instead is viewed as having a cultural reality (Gossett, 1965). Race is therefore a cultural construct of the human mind.

Ethnicity - Ethnicity is part of the social self. It is through ethnicity that one develops a sense of people hood and a shared community with others who are members of the same group. Ethnicity is also an experientially based identity that is always in process (Gefland & Barresi, 1987). In this research ethnicity and race are used interchangeably.

Minorities - Minorities in this research basically refers to Blacks and Hispanics. Blacks, Hispanics as well as Whites are computed as a percentage of the entire population of the spatial unit.

Median Household Income - According to the US Bureau of Census, household income is the sum of money income received in the previous calendar year by all household members 15 years old and over, including household members not related to the householder, people living alone, and others in non-family households. The median household income is frequently used as a measure of the average household income. Median household is extracted from individuals and families and therefore has a smaller margin of error than most mean income measures.

Education - The population with less than 9th grade education will be calculated as a percentage of the total population aged 25 years or older in the spatial unit. Communities with a high percentage of adults with less than 9th grade education have a relatively low level of education.

Per Capita Income –It measures income per unit of population for each person.

Public Assisted Households- Public assisted households include households that receive any form of public assistance such as Aid to Families with Dependant Children (AFDC) households receiving food stamps, housing assistance (section 8 properties) and Medicaid.

Male-Headed Households – Single parent household with male present with children less than 18 years calculated as a percentage of households with both parent present.

Female-Headed Households - Single parent household with female present with children under 18 years calculated as a percentage of households with both parent present.

CHAPTER 3

THE NORTH CENTRAL TEXAS REGION

The North-Central Texas region consists of 16 counties including: Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant and Wise County. It has an estimated population of 5,119,963 (US Census Bureau, 2000). The total area of the Region is 15,132 square miles with an average county size of about 848.9 square miles. The region is made up of both rural and urban counties, and has a diverse population of Whites, Blacks and Hispanics. It is one of the fastest growing areas in the State of Texas especially the Dallas-Fort Worth Metroplex and has had its share of problems associated with urban sprawl. Figure 2 provides a map area of North Central Texas with county boundaries.

Dallas and Tarrant Counties are the most populated and most urban in the region. Somervell is the least populated and most rural with a population of about 5360. Denton and Collin counties exhibit both rural (north) and urban (south) variation. Whites make up the greater proportion of the entire population (70.1%), Hispanics (13.8%), and Blacks (13.2%). More ethnic minorities are in urban areas than in rural areas because of easy assimilation and better job opportunities. Dallas and Tarrant Counties have the most minority populations and most of them live in the inner cities close to the Central Business District. Most of the jobs in commerce and industry in the region are located in these two counties.

The population of the region has increased rapidly over the last decade. Between 1990 and 2000, the population increased from 4,698,490 to 5,119,963, a total increase of about 9%. The highest percentage population growth between 1990 and 2000 was Hispanics, a total growth of about 45.72, which was fueled by the growth in the number of Hispanics along the Mexican border.

In terms of age distribution, the largest age group those between age's 15-44 years; make up 51.5% of the entire population with a fertility rate of 71.6 per 1000 women. In 1998, adolescent mothers less than 18 years of age made up 5.9% of all births in the North Central Texas (NTC). The region has a progressive youthful population structure, that is, the largest age bracket are those between the ages of 15 and 44 years as illustrated in Figure 3. Black and Hispanic populations have a higher proportion of children less than five years of age.

Within this study area average poverty rate is 17.54%, with the lowest poverty rate in the Collin County. The government provides welfare and health insurance in the form of Medicaid aid to most of the regions poor families. In 1998 for example the average number of monthly food stamp recipients in North Central Texas was about 433,129 people and Medicaid recipients numbered about 462,157. Comparatively, poverty is three times more common among Black families than Whites and less common among families with more education. Black families are disproportionately poor and also display higher rates of teen birth compared to their white counterparts.

The region has had its share of problems with urban sprawl. Poor families, especially poor Blacks as well as poor Hispanics live mostly in low maintenance housing complexes in urban areas. Most poor families are female-headed households with low educational status (Henly, 1993). Their plight is worsened further by the dichotomy of being a worker and a mother who has to take care of children alone.

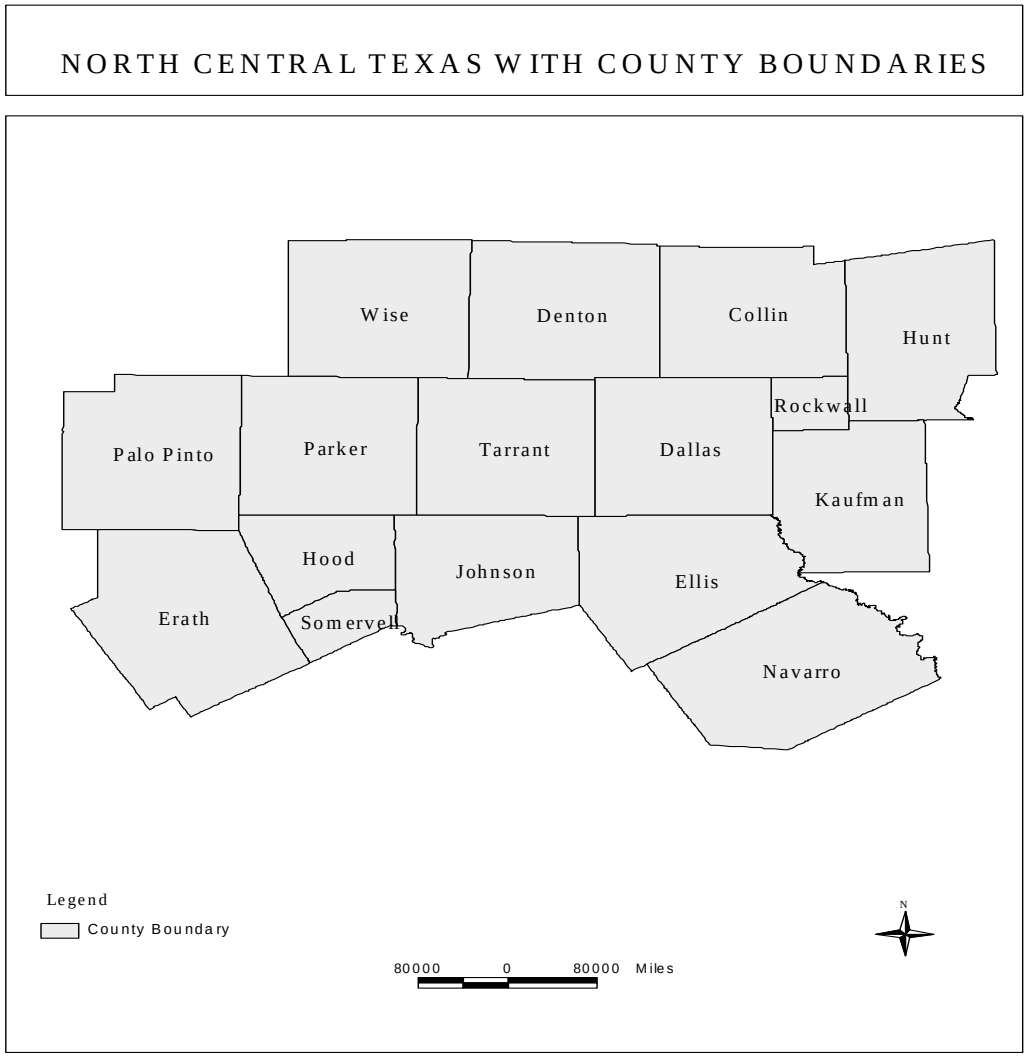

Figure 2 North Central Texas - County Regions

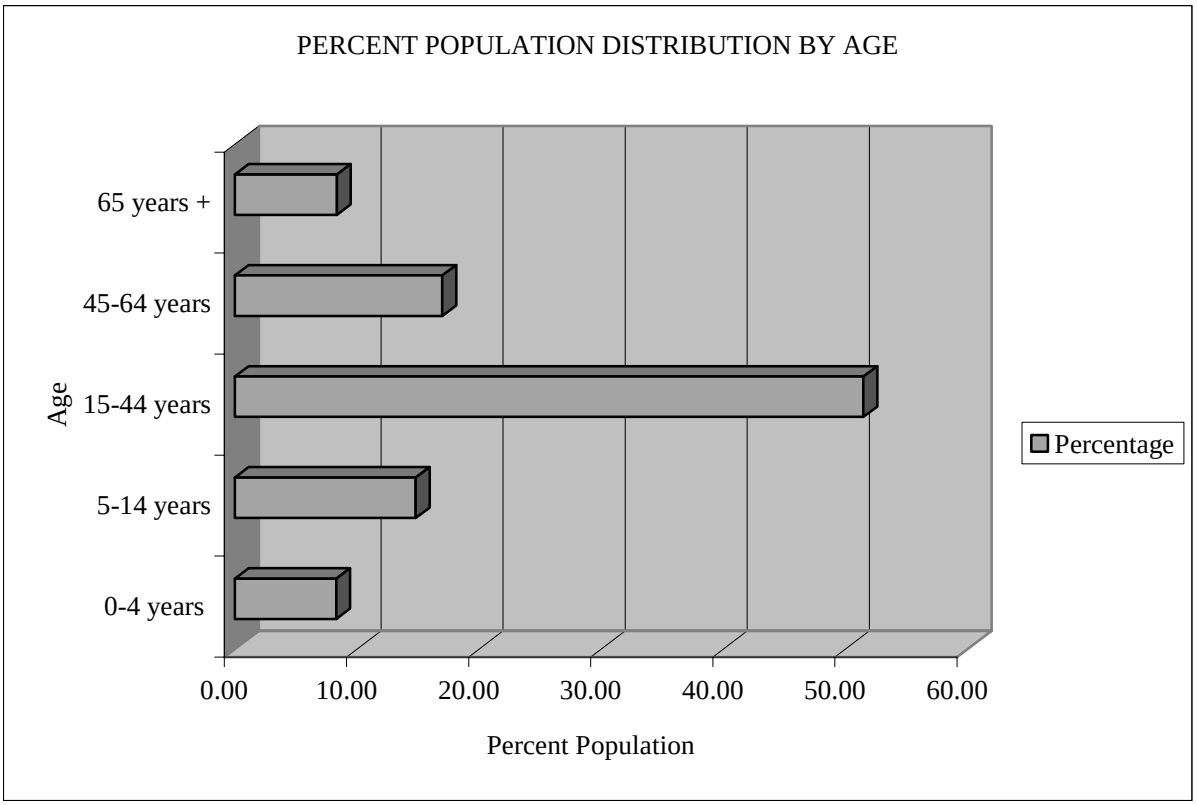

Figure 3. Population distribution by age group with a progressive age distribution structure

Age	Total Persons	Percentage
0-4 years	341977	8.32
5-14 years	609470	14.82
15-44 years	2117374	51.50
45-64 years	698903	17.00
65 years +	344026	8.37
Total	4111750	100.00

Table 1. Total and percent population distribution by age group

Data sources and Measurements

Teen birth rates for the 16 counties of North Central Texas are calculated as the number of live births by teens divided by the number of teens for each county multiplied by 1000. Table 2 provides a summary of data used in this research and their sources. At the beginning of the study the results of the 2000 U.S. Census were not available, thus the 1990 Census were used.

DATA SOURCE	TYPE OF DATA	SCALE/RESOLUTION
NCTCOG (North Central Texas Council of Government)	Base map	NCT Region with County boundaries
U.S. CENSUS BUREAU	Teen Population (1990)	County Level
TDH (Texas Department of Health)	Number of teen births (1998)	County level
NCTCOG (North Central Texas Council of Government)	Base map	Dallas County with Zip code boundaries
U.S. CENSUS BUREAU	Median Household Income (1990)	County Level
U.S. CENSUS BUREAU	Per Capita Income (1990)	County Level
U.S. CENSUS BUREAU	Race/Ethnicity (1990)	County Level
U.S. CENSUS BUREAU	Education (1990)	County Level
U.S. CENSUS BUREAU	Female Headed Household (1990)	County Level
U.S. CENSUS BUREAU	Male Headed Household (1990)	County Level
U.S. CENSUS BUREAU	Public Assisted Household (1990)	County Level
U.S. CENSUS BUREAU	Teen Population (1990)	Zip code level
TDH (Texas Department of Health)	Number of teen births (1998)	Zip code level
U.S. CENSUS BUREAU	Median Household Income (1990)	Zip code level
U.S. CENSUS BUREAU	Per Capita Income (1990)	Zip code level
U.S. CENSUS BUREAU	Race/Ethnicity (1990)	Zip code level
U.S. CENSUS BUREAU	Education (1990)	Zip code level
U.S. CENSUS BUREAU	Female Headed Household (1990)	Zip code level

U.S. CENSUS BUREAU	Male Headed Household (1990)	Zip code level
U.S. CENSUS BUREAU	Public Assisted Household (1990)	Zip code level

Table 2. Summary and scale of data sources

Methodology

First a base map of North Central Texas in Arc/View is downloaded from the NCTCOG web site. Before any preliminary analyses are performed, all the coverages are projected into State Plane Coordinate and formatted into an ArcView shapefile. All the spatial analyses for this research are performed using ArcView GIS. A map in ArcView shapefile format of the region is produced with teen birth rate to show the differences in the distribution of teen birth rates across the region for 1998 using graduated colors. Graduated color maps are primarily used for numeric data with progression or range of values to show the differences in the values. Spearman's rank correlation analysis and independent sample T-Test equality of means is used to test for differences in teen birth rates for both rural and urban counties.

Correlation analysis is used to test the second hypothesis to establish the relationship between the dependent variable (teen birth rate) and economic status-related independent variables (median household income, per capita income and public assisted households). Maps are also produced from economic data for median household income, per capita income and public assisted households at the zip code level for Dallas County to visually compare and analyze with teen birth rate data map for any association.

To test the third hypothesis, correlation analysis is used to establish the relationship between the dependent variable (teen birth rate) and low education. A map showing percent less than 9^{th} grade education was produced at the zip code level, and visually compared and analyzed with the teen birth rate.

The fourth and fifth hypotheses are tested similarly, as the second and third hypotheses. Correlation analysis is used to further test the fourth and fifth hypotheses to establish any relationship between the dependent variable (teen birth rate) and independent variables (percent female headed household, percent male headed household, percent Blacks, percent Whites, percent Hispanics). Graduated color maps are also produced and analyzed with the teen birth rate. Finally, Regression analysis is further used to determine the amount of variation in teen births that is explained by the independent variables.

CHAPTER 4

EXPLAINING TEEN BIRTHS IN NORTH CENTRAL TEXAS COUNTIES

Teen birth is not uniformly distributed in North Central Texas counties and seems to be influenced by the level of urbanization. Dallas County, the most urban in the region, with the highest number of teens, had the highest number of teen births (6,161) for 1998, more than half the total number of teen births in the region. Tarrant County has the second highest number of teen births with 3,152 live births in 1998. Denton and Collin County follow with 489 and 420 respectively for the number of live teen births in 1998. Sommervell County had the lowest number of teen births in 1998 with a total number of 17.

The geography of teen birth rate is however different. Ellis County had the highest teen birth rate (68.27 births per 1000 live births), three times higher than the region-wide average of 20.84. Clearly, this deserves further study (Table 4). It appears that higher teen birth rates occur predominantly in rural areas. Palo Pinto County had the second highest teen birth rate (26.27), while Navarro and Dallas Counties had 24.62 and 24.52 respectively. Erath County had the lowest rate of teen birth of 4.37 live births per 1000 (Table 3). Figure 4 presents a map of teen birth rates in North Central Texas. How do we explain these spatial patterns?

Following the hypothesized explanatory factors for teen births in this research a county level of analysis is initially pursued. A simple multiple correlation analysis (Table 3) presents the relationship between teen births and the explanatory variables.

Eleven independent variables were used in the county level correlation analysis — percent teen population, percent less than 9th grade education, percent male household with children under 18 years, percent female headed household with children less than 18 years, per capita income, median household income, percent public Assisted Households, percent Hispanic population, percent Black population, percent white population and county type – rural or urban.

Independent Variables	Correlation Coefficient (Spearman's)
Percent teens	-.394
Percent less than 9th grade education	.429
Male Household with child (>18 years)	.009
Female Household with child (>18 years)	.218
Public Assisted Households	.494
Median Household Income	-.621*
Per Capita Income	-.574*
Hispanics	.200
Whites	-.097
Black	.079
County Type (Rural vs. Urban)	.366

*. Correlation is significant at the .05 level (Spearman's 2-tailed)

Table 3. Independent variables initially selected for analysis with their correlation coefficient.

The only two variables that correlated significantly with teen birth were per capita income and median household income. Clearly, and as hypothesized, income is an important determinant of teen birth. Counties with residents having high income have low teen births and vice-versa.

Beside the income variables, none of the others were statistically significant. For example, the socioeconomic variables, percent less than 9^{th} grade education and percent public assisted households, had high correlations and in the hypothesized direction, but were not statistically significant. Similarly, percent male-headed household with children under 18 years, percent female headed household with children less than 18 years and county type all recorded a positive correlation with teen births but were not statistically significant. Percent teens recorded a negative correlation that was not statistically significant. The race/ethnicity variables, percent Hispanic population and percent Black population recorded positive correlations while percent white population recorded a negative correlation but none of these was statistically significant.

To determine the effect of urbanization on teen birth rates a difference of means test was used. The 16 counties in North Central Texas were classified into rural and urban counties in accordance with the North Central Texas Council of Governments. Five counties, Collin, Dallas, Denton, Ellis and Tarrant were classified as urban while the rest, Erath, Hood, and Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell and Wise were classified rural.

The difference of means test did not show a statistical difference in teen births between urban and rural counties (Table 4). This suggests that teen birth rates in urban

counties are similar to rural counties contrary to what might be expected. For example, rural areas are generally farming communities with high birth rates, may have less access to abortion services and may be more accommodating of teen births while urban areas may have higher expectations and opportunities for higher levels of education, factors which together contribute to lower teen births. It may be due the modifiable area unit problem - county level reporting conceals intra-county rural urban differences. This suggests that a finer level of analysis, e.g. zip code level may be more appropriate.

To probe this further, an independent sample T-Test was conducted on all eleven variables. Percent teens, teen birth rate, percent public assisted households, percent less than 9th grade education, and percent White population had a higher mean for rural counties than urban counties. For instance the mean value for teen birth rates, percent less than 9th grade education and public assisted households in rural areas were more than one and half times higher for rural counties than urban counties. The mean value for median household income, per capita income, female-headed households, percent Black Population, percent Hispanic were higher in urban counties than in rural counties.

The results were mostly intuitive. Median household income was significantly higher in urban counties than in rural counties ($p = .05$). Similarly, Per Capita Income, Percent Public Assist Households, Percent Less than 9^{th} grade Education, Percent White population, Percent Hispanic population were statistically different between urban and rural counties. Percent Teens, Percent male-headed Household with child less than 18 years, Percent female-headed Household with child less than 18 years, Percent Black population were not statistically significant.

Variables	County Type 1-urban 2-rural	Mean	T-test for equity of means sig.* (2-tailed)
Percent Teens	1 2	14.48 15.25	.22
Teen Birth Rate	1 2	14.44 23.76	.22
Median Household Income	1 2	35485.40 27728.91	.05*
Per Capita Income	1 2	16045.60 12350.27	.016
Percent Public Assist Households	1 2	3.73 6.15	.032*
Percent Less than 9th grade Education	1 2	7.56 11.36	.05*
Percent Male-headed Household with child <18	1 2	1.42 1.29	.38
Percent Female-headed Household with child <18	1 2	5.56 4.60	.16
Percent White	1 2	80.86 90.47	.03*
Percent Black	1 2	10.18 5.04	.16
Percent Hispanic	1 2	10.92 6.98	.04*

Table 4. T-test results for equity of means

County	County Type 1 urban 2 rural	Total number of teens ('90)	Total number of teen births ('98)	Teen births Rate ('98) (Per 1000 teens)
Collin	Urban	39130	420	10.73
Dallas	Urban	251290	6161	24.52
Denton	Urban	38513	489	12.70
Erath	Rural	13949	61	4.37
Ellis	Urban	4248	290	68.27
Hood	Rural	3822	72	18.84
Hunt	Rural	9386	197	20.99
Johnson	Rural	15557	307	19.73
Kaufman	Rural	8272	146	17.65
Navarro	Rural	6052	149	24.62
Palo Pinto	Rural	3540	93	26.27
Parker	Rural	9968	153	15.35
Rockwall	Rural	4011	59	14.71
Sommervell	Rural	927	17	18.34
Tarrant	Urban	158604	3152	19.87
Wise	Rural	5309	88	16.58

Table 5. North Central Texas Counties, county type, total number of teens, total number of teen births and teen births rates for 1998.

To probe the high rates of teen births in Ellis County further, Table 6 presents a breakdown of age groups and the number of teen births by race in Ellis County.

AGES (YEARS)	WHITES	BLACKS	HISPANICS
10-14	93	20	53
15-17	51	20	47
18-19	2	1	2
TOTAL	146	41	102
TEEN BIRTH RATES	27.61	49.58	107.03

Table 6. The number of teen births by race and age group. Ellis County, 1998.

Hispanics had the highest teen birth rate of 107.03 per 1000 teens, followed by Blacks 49.58 per 1000 and Whites with 27.61 births per 1000.

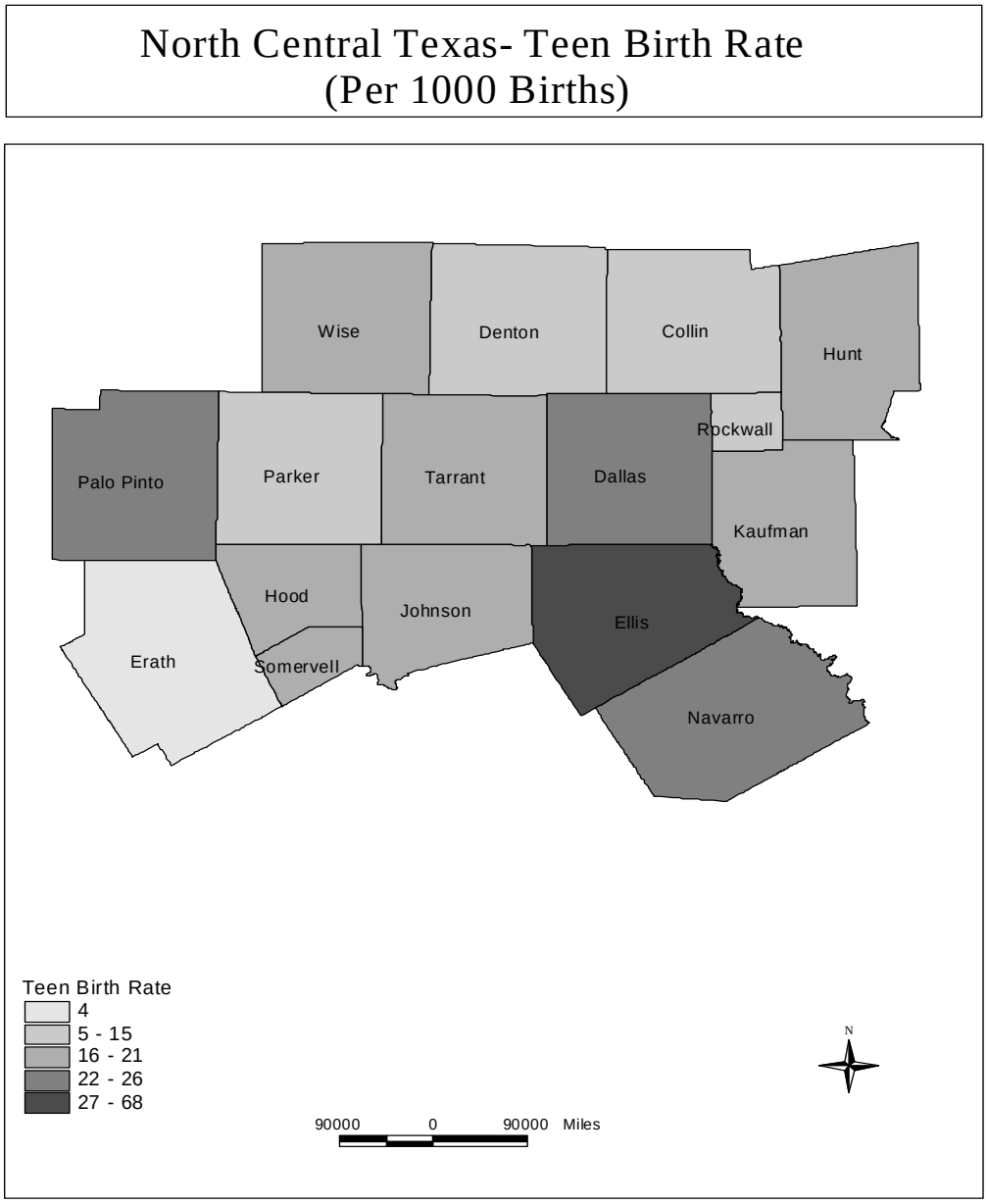

Figure 4. Teen birth rate distribution per county in North Central Texas 1998

The rest of the study is devoted to a detailed examination of teen births in Dallas County by zip code, which will have more variability than the county level analysis. Zip code data on teen births for Dallas County in 1998 was readily available unlike Ellis County, which would have been the logical choice for an in depth analysis since it had the highest teen birth rate in North Central Texas.

CHAPTER 5

DALLAS COUNTY

Dallas County (Figure 5) is one of the most urbanized counties in North Central Texas and one of the fastest growing counties in the US. It consists of 23 contiguous cities with about 85 zip codes. As at 1990, the county had a total estimated population of 2,168,440 with about 54.3% of its entire population residing in the City of Dallas. The population in Dallas County is diverse. Whites make up 60.6% of the entire population. Blacks and Hispanics make up the second largest race/ethnic group of about 20.8% and 29.9% respectively (U.S. Census Bureau, Census 2000 Summary File 1). Most of the minority population especially Blacks and Hispanics reside in the City of Dallas. Table 7 presents a breakdown of the population by race.

Total Population	Persons	Percent total
White	1,343,900	60.6
Black or African American	462,609	20.8
American Indian and Alaska Native	22,777	1.0
Asian	98,563	4.4
Native Hawaiian and Other Pacific Islander	2,920	0.1
Hispanic or Latino (of any race)	662,729	29.9
Some other race	350,798	15.8

Table 7. Total population of Dallas County by Race and Hispanic Origin, 2000

DALLAS COUNTY WITH ZIPCODE AND CITY BOUNDARIES

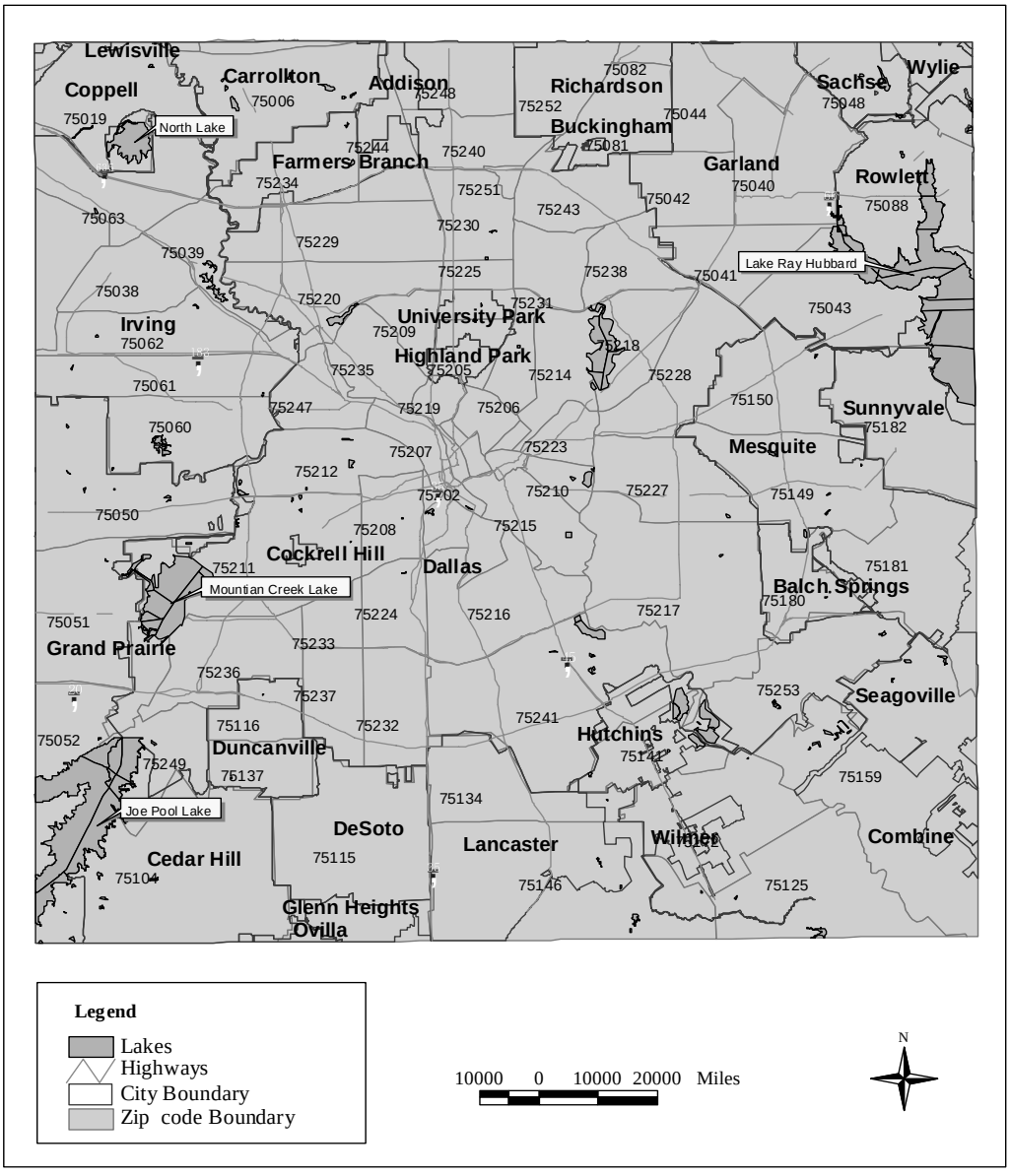

Figure 5. Dallas County area map with zip code and city boundaries

Light industries such as food processing and packaging which attract a lot of migrant labor, both professional and non-professionals, in Dallas County. Financial Institutions such as banks, insurance agencies and marketing firms have their headquarters or subsidiaries in the county mostly in the Central Business District located of the City of Dallas. Employment opportunities in construction have also attracted a lot of migrants from other parts of the region.

The Hispanic population has increased very rapidly over the last decade. Table 12, provides a breakdown of the percentages of Whites, Blacks and Hispanics in Dallas County by Zip code. See appendix for table 12. Figures 6, 7 and 8 illustrate the percent distribution of Whites, Blacks and Hispanics in Dallas County.

Most of the White population in Dallas County lives outside the City of Dallas except for areas around Highland Park and University Park, have about 95% to 98%, Whites (Figure 6). The major areas of concentration include the upper west, City of Coppell, and the eastern portion of the region except for the southeastern. In zip code 72141, the White population drops sharply to 50%. Other White enclaves include zip code 75116 (85.53% White) in the City of Duncanville, 75248 and 75252.

The Black population of Dallas County is mostly concentrated in the middle portion of the county especially the mid-south eastern and mid-south western part of the county (Figure 7). In zip codes 75271, 75210 and 75215, Blacks make up more than 90% of the entire population. Overall, Blacks make up more than 60% of the entire population in areas shown in darker color shade (Figure 7).

Hispanics are mostly concentrated in the west central part of the county and around Wilmer in the South East (Figure 8). In terms of percentage distribution, unlike the Black and White population, who have the highest population distribution and concentration in a zip code at about 90% and more, the highest population concentration for Hispanics in Dallas County is between 51% to 58% except for zip code 75226 in the City of Dallas where Hispanics make up 70.42% of the entire population.

DALLAS COUNTY WITH PERCENT WHITE POPULATION 1990

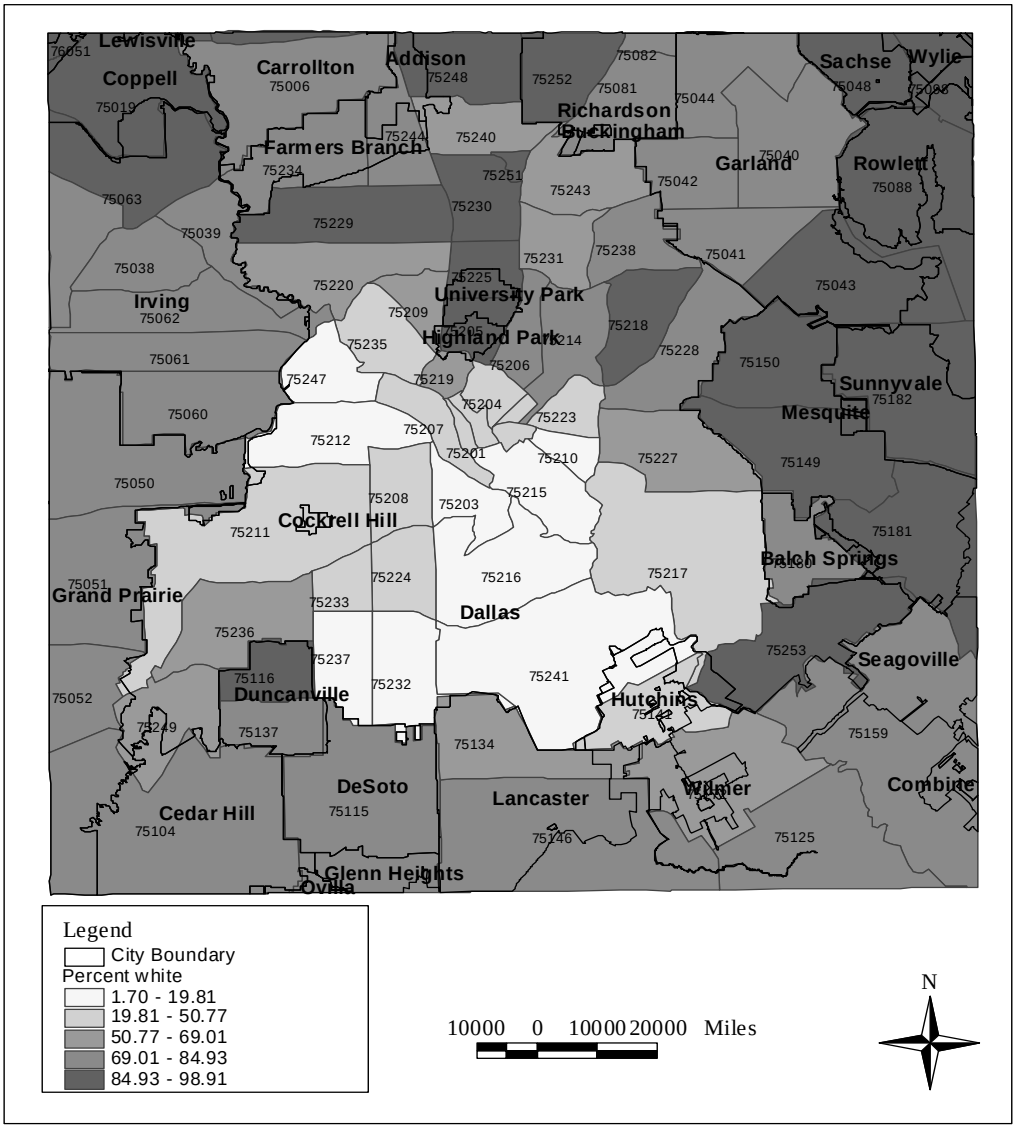

Figure 6. Dallas County percent White population distribution, 1990

DALLAS COUNTY WITH PERCENT BLACK POPULATION
1990

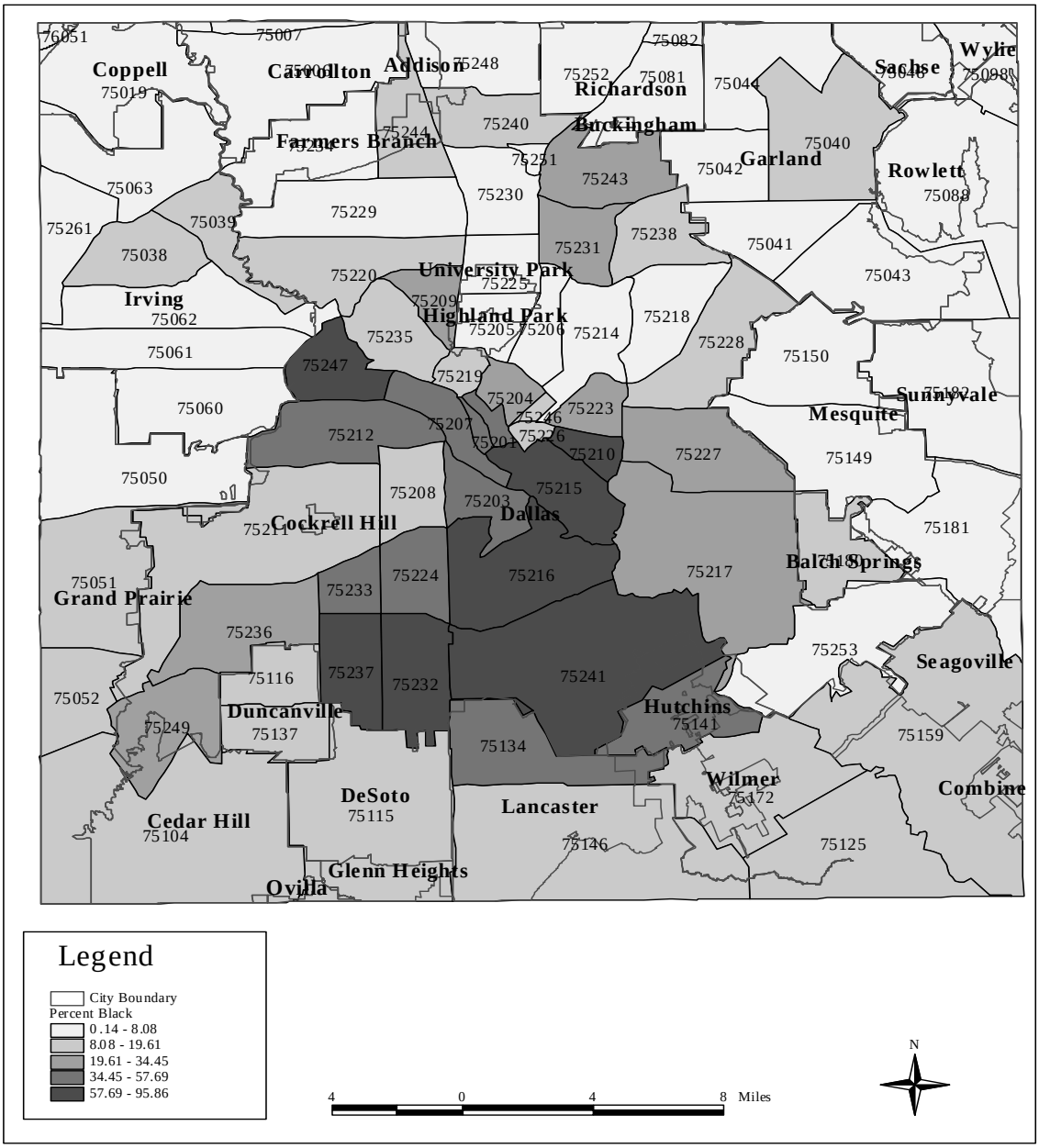

Figure 7. Dallas County percent Black population distribution, 1990

DALLAS COUNTY WITH PERCENT HISPANIC POPULATION
1990

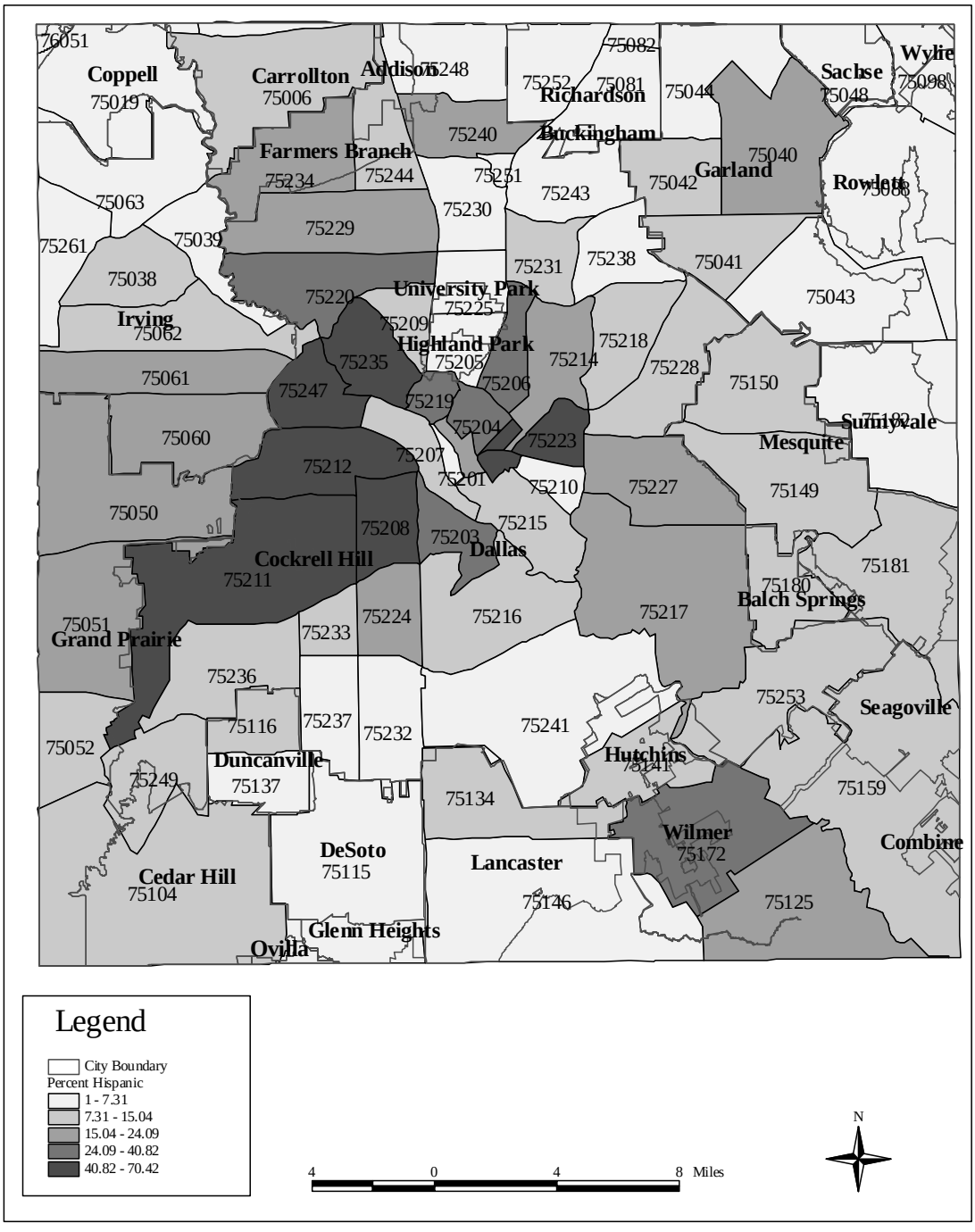

Figure 8. Dallas County percent Hispanic population distribution, 1990

Teen Births in Dallas County

For the 85 zip codes in Dallas County teen birth rate varies from a low of 0 births per 1000 as represented by zip codes, 75247 in the City of Dallas and 76051 in Grapevine and as high as 147.4 live births per 1000 teens, for zip code 75231 in the City of Dallas, which is the highest in the County.

Zip codes	85
Mean	34.50
Median	31.056
Std. Deviation	26.50
Variance	702.39
Skewness	1.261
Kurtosis	3.02

Table 8. Vital statistics of frequency for teen birth rates

A mean teen birth rate of 34.5 per 1000 teens was obtained and best represented by zip code 75243 in the City of Dallas. Teen birth rates are quite similar among zip codes and most are within two standard deviations of the mean teen birth rate. Table 8 contains the descriptive statistics of teen birth rate for the 85 Zip codes.

The mean value of 34.46 was larger than the median value of 31.05 as a result of its sensitivity to outliers that occur in the right tail. Ten extreme values or outliers in the dataset were recorded. Five zip codes had very low teen birth rates below 0.41 per

thousand teens and the other five zip codes had high teen birth rates above 76.9 per thousand teens (Table 9).

Teen birth rate		Zip code	Birth per1000 teens
HIGHEST RATES	1	75231	147.37
	2	75220	102.31
	3	75226	94.46
	4	75219	87.40
	5	75201	76.92
LOWEST RATES	1	75251	.00
	2	76051	.00
	3	75247	.00
	4	75261	.28
	5	75007	.41

Table 9. Extremes values of teen birth rate and their corresponding zip codes

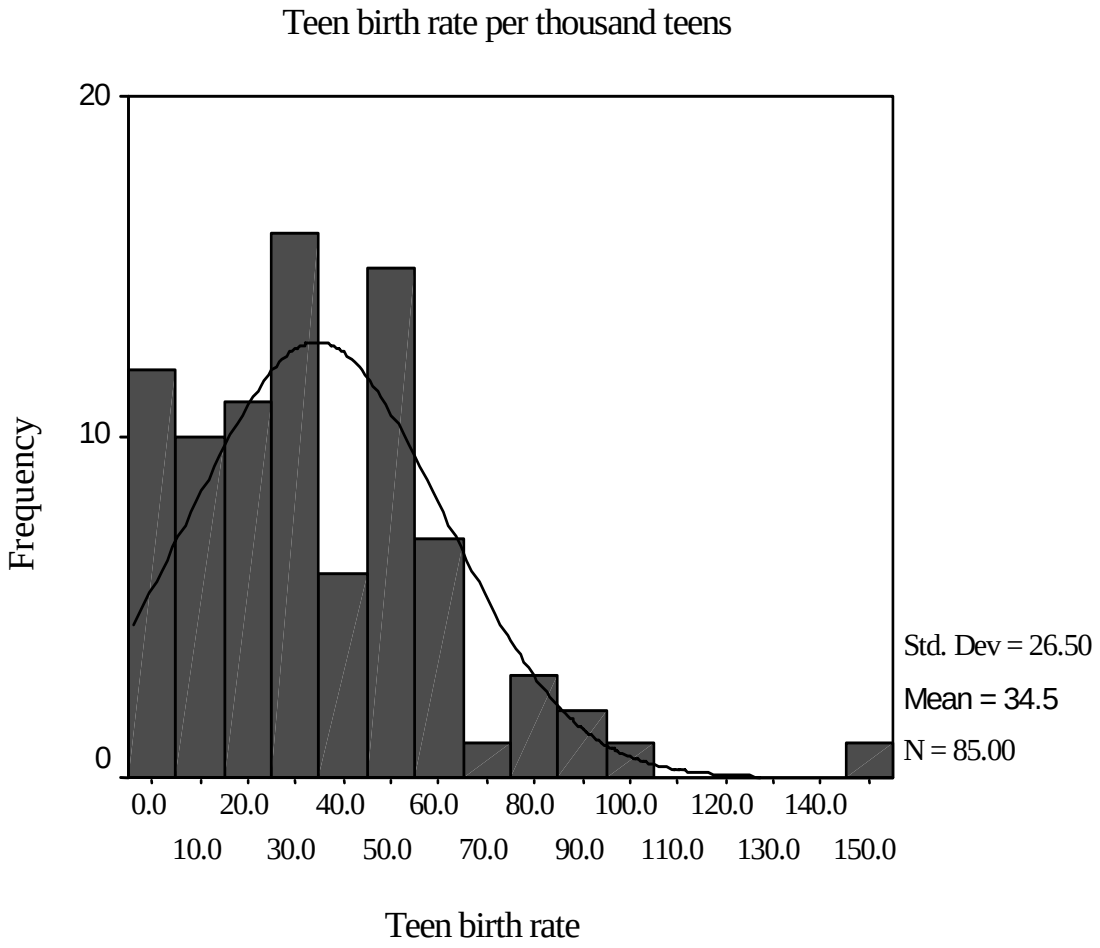

Figure 9. Histogram of teen birth rate with an asymmetric curve

The histogram (Figure 9) represents the frequency for the entire dataset of teen birth rate, which shows skewness to the right, an asymmetric curve indicating large positive values for skewness with a long right tail. Most of the teen birth rate values are concentrated on the left side of the histogram and a few on the right above 100 births per 1000. Also, out of the 85 zip codes 38 had percent teen birth rate greater than the county average of 34 live births per 1000 and 12 out of 85 zip codes greater than the regions

average of 56 live births per 1000. Out of the 85 zip codes analyzed, 40 zip codes, which is nearly half were below the mean and 45, which is more than half were above the median value. Thus, the best measure of central tendency for this data set is the median.

The average teen birth rate for North Central Texas is 20.84 live births per 1000 and that of Dallas County is about 34.50 live births per 1000, which is one and half times higher than the region's average. Figure 10 shows zip codes with mapped values of teen birth rates, outliers and means teen birth rate in Dallas County. Star symbols were used to identify outliers and mean teen birth rate. Five stars indicates the zip code with the highest teen birth rate 147.37 births per 1000 which was over 4 times higher than the mean teen birth rate in Dallas County. Zip codes with three stars had teen birth rates above 75 births per 1000 but below 100 births per 1000. Four stars is the zip code with the second highest teen birth rate with 102.31 births per 1000. Zip codes with one star are those with the lowest teen birth rate and had teen birth rate below 0.42 births per 1000. The mean teen birth rate is represented by zip code 75243. Due to the skewness in the dataset, a nonparametric correlation analysis, Spearman's rank correlation coefficient analysis is used.

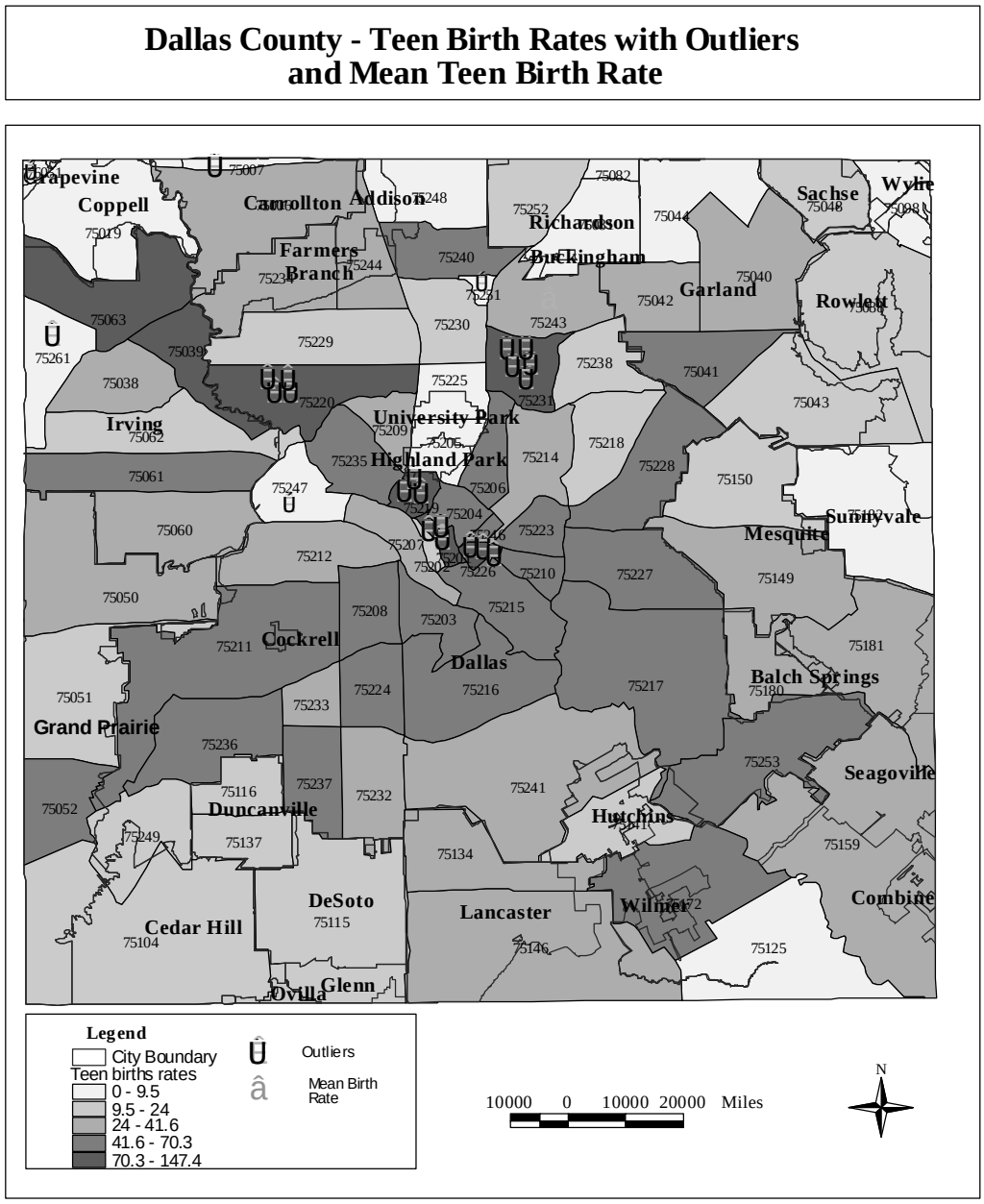

Figure 10. Distribution of teen birth rate, outliers and mean teen birth rate in Dallas County.

CHAPTER 6

EXPLAINING TEEN BIRTHS IN DALLAS COUNTY ZIPCODES

Ten independent variables were initially selected for the correlation analyses. They are percent teen population, percent less than 9th grade education, percent male household with children under 18 years, percent female headed household with children less than 18 years, per capita income, median household income, percent public assisted households, percent Hispanic population, percent Black population and percent white population. Table 10 provides the results of the correlation analysis.

Independent Variables	Correlation Coefficient (Spearman's)
Percent teens	-.222*
Percent less than 9th grade education	.256*
Male Household with child (>18 years)	.048
Female Household with child (>18 years)	-.039
Percent Public Assisted Households	.083
Median Household Income	-.717**
Per Capita Income	-.418**
Percent Hispanics	.608**
Percent Whites	-.573**
Percent Black	.468**

Correlation is Significant at the .01 level** and 05 level* (Spearman's 2-tailed)
Table 10. Independent variables with correlation coefficient

Economic Status and Teen Birth Rates

It was hypothesized that teen birth and its proximate behavioral determinants have developed as a result of low-income status. Thus, teen birth rate would be higher in zip codes with low median household income, low per capita income and high percent public assisted households. As expected, the correlation between teen birth rates, median household income and per capita income was negative and statistically significant. However, correlation between teen birth rates and Public Assisted Households was low and not statistically significant. ***PROVIDE DISCUSSION

Figure 11 presents a scatter plot indicating a strong inverse correlation between teen birth rate and median household income with a correlation coefficient of -.72 significant at the .01 level. That is teen births are high in zip codes with low median household income. It appears that as median household income of a zip code rises, teen birth rates decrease, and decrease significantly in Zip codes with at least $40,000 per year. The reverse also holds true, that is, as teen birth rate decreases in a zip code median household income rises.

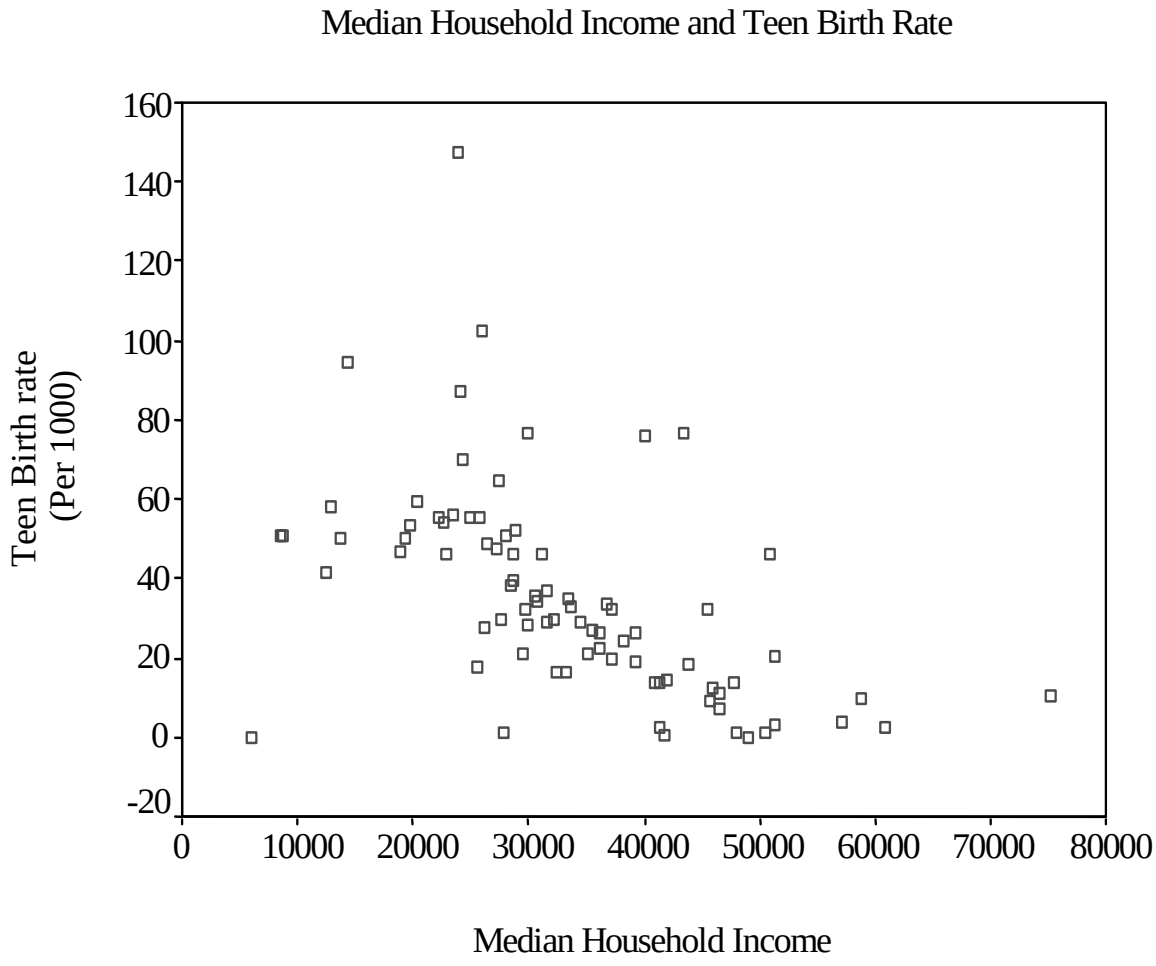

Figure 11. Scatter plot between teen birth rate and median household income

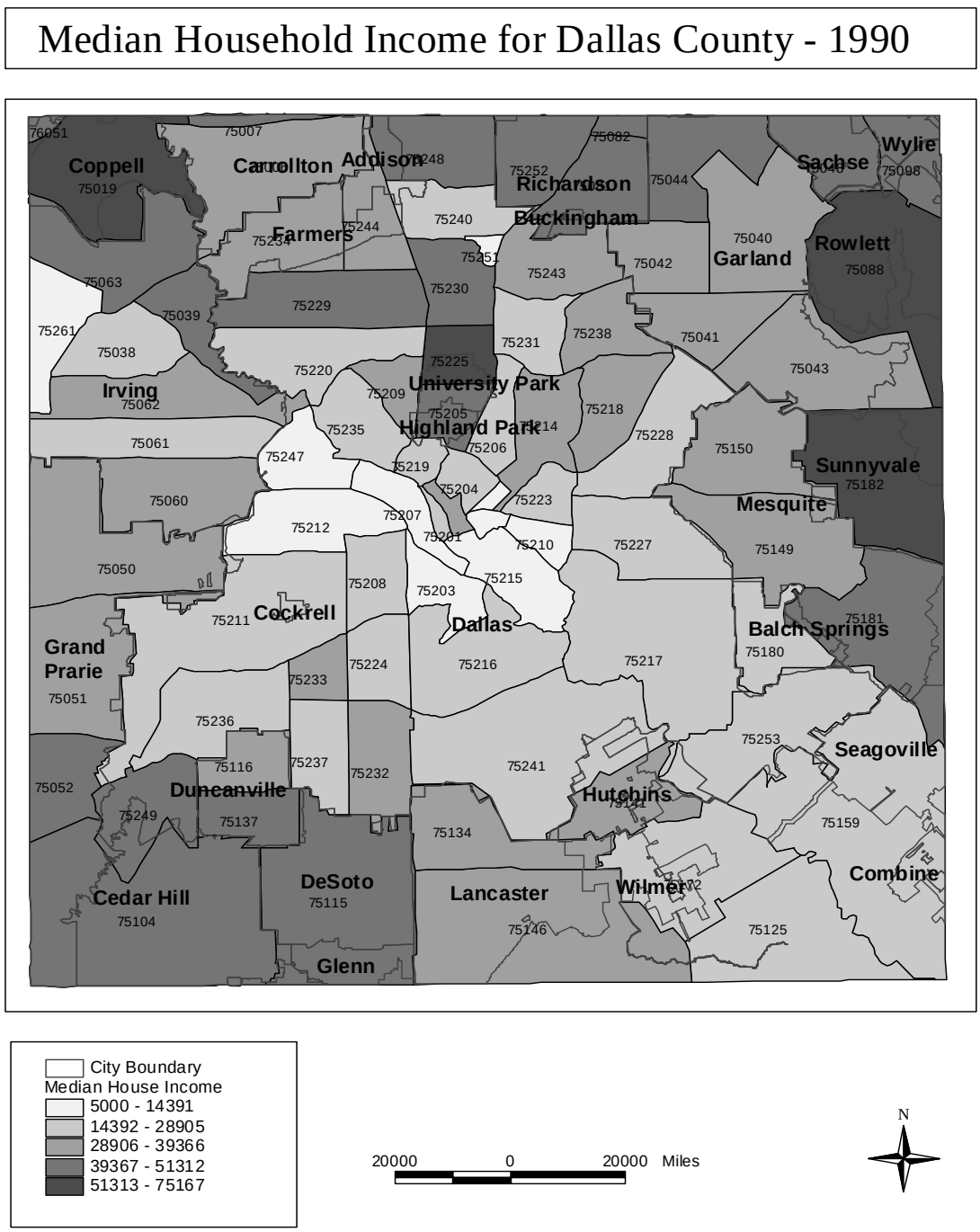

Figure 12. Median Household Income distribution for Dallas 1990

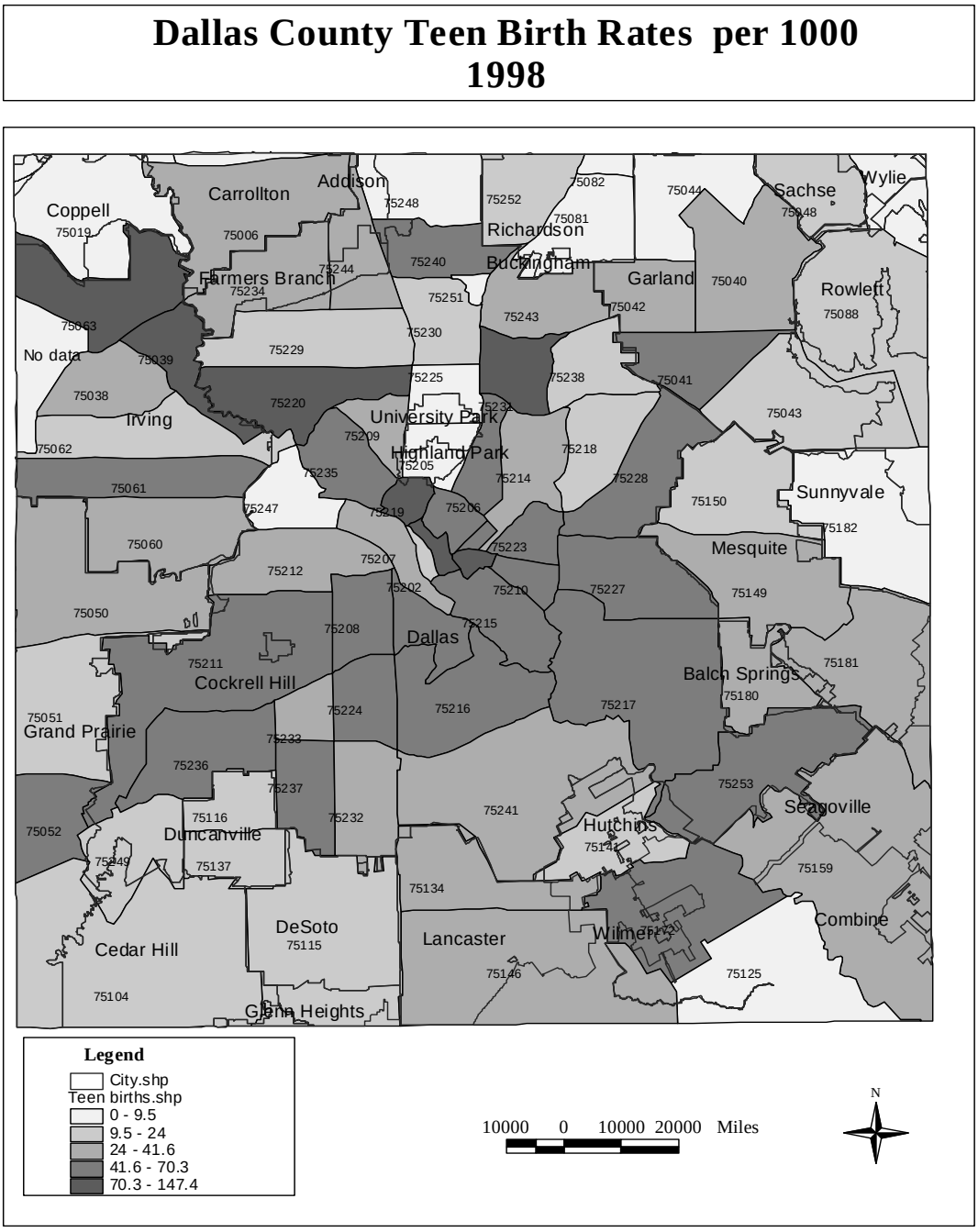

Figure 13. Teen birth rate distribution for Dallas County, 1998

A visual examination of (Figure12) median household income and teen birth rates (Figure13) confirms an association between teen birth rates and median household income. Areas with high median household income generally have a lower teen birth rate. The upper west corner, including Coppell and eastern portion including Rowlett and Sunnyvale, has very high median household income and relatively low teen birth rates. Duncanville, Cedar Hill, Desoto and Glenn in the southern portion of the county also have high median household incomes. Zip codes 75082 (Richardson), 75052 (Grand Prairie), 75248 (Dallas), 75229 (Dallas), 75182 (Mesquite), 75019 (Coppell), 75225 (Dallas) and (Rowlett) 75088 have median household income above $50,000. Rowlett has the highest median household income of $75,167. In contrast zip codes with low median household income have corresponding high teen birth rates. For example zip codes 75247, 75210, 75215 and 75212 all in the City of Dallas have median household income below $13,000 and a high teen birth rate of more than 40 births per 1000 teens.

Similarly the correlation analysis indicates that per capita income is inversely correlated to teen births with a correlation coefficient of -.42, significant at the .01 level. As teen births rise per capita income decreases and verse versa, which indicates that teen births predominate in poorer communities and in families whose annual income is low (Figure 14).

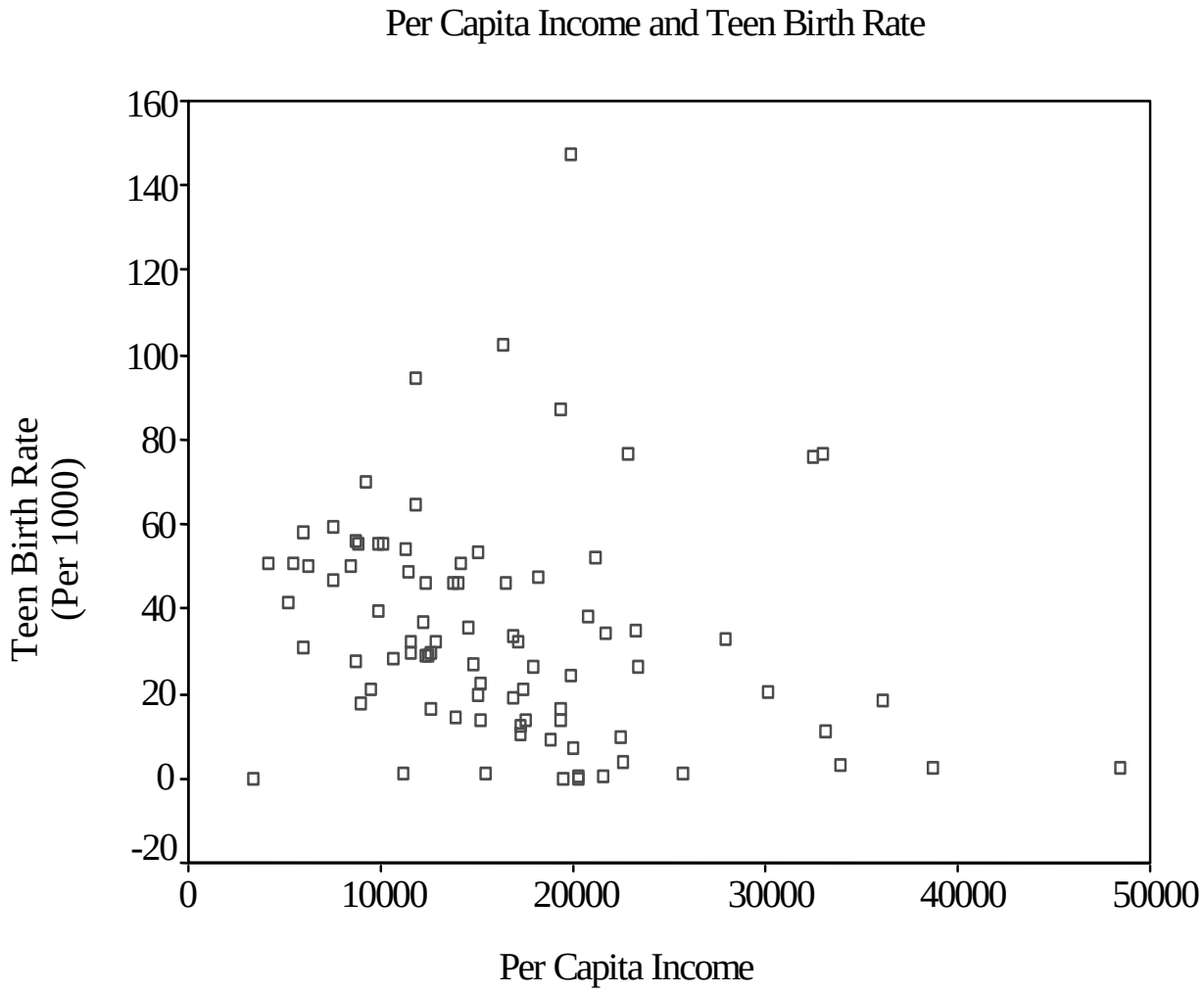

Figure 14. Scatter plot of teen birth rate and per capita income

Per Capita Income for Dallas County - 1990

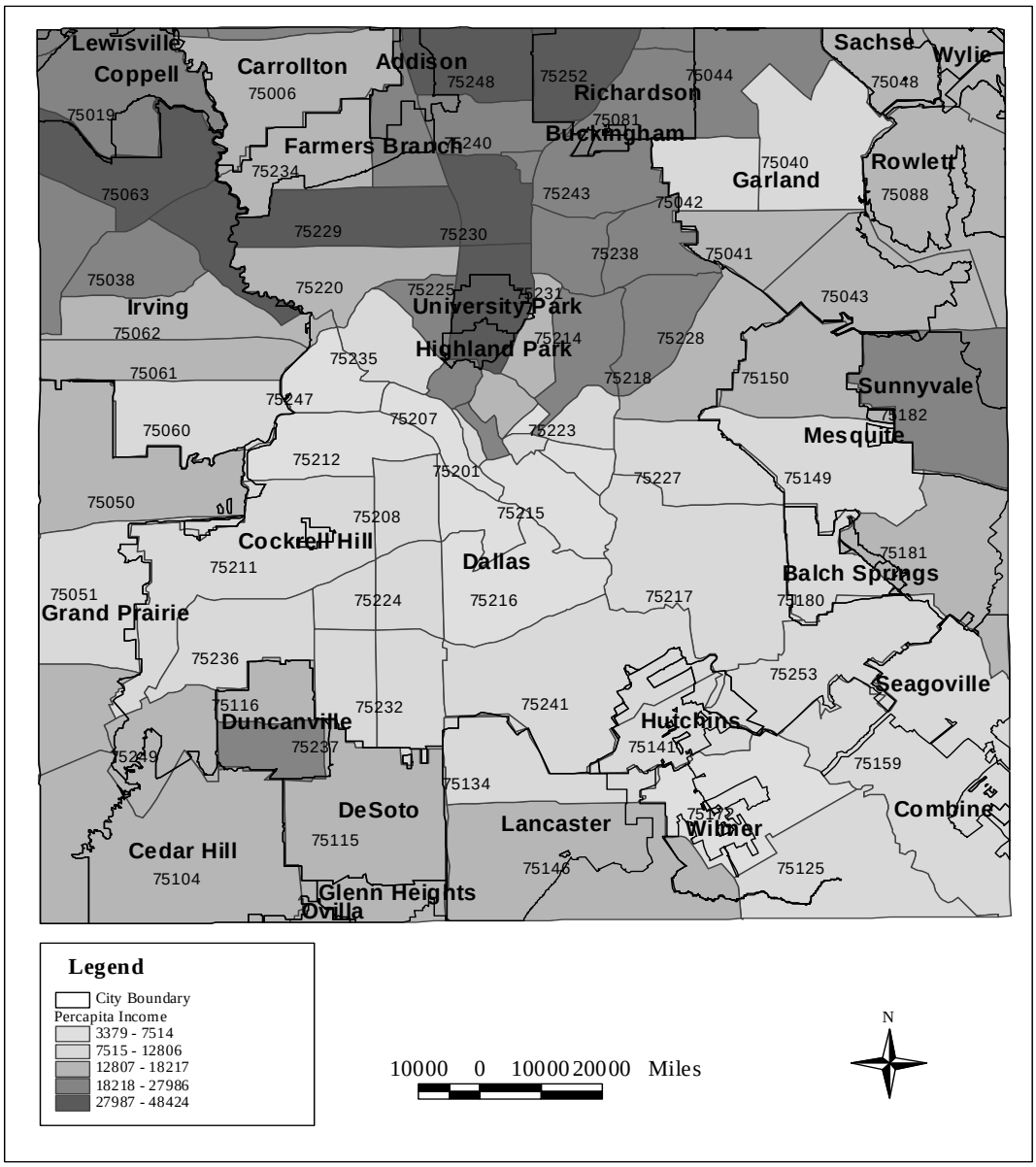

Figure 15. Per Capita Income distribution for Dallas County, 1990

Figures 13 and 15 reveal an association between teen birth rates and per capita income. Areas with high per capita income distribution, including Highland Park, University Park, Addison, Richardson and Coppell have a lower teen birth rate. The northern portion of the county has relatively higher per capita income with low teen birth rate than the south, except for the areas around Duncanville (75137). Zip codes 75225 (University Park) and 75205 (Highland Park), have per capita income above $38,000. Highland Park has the highest per capita income of $48,424. In contrast zip codes with low per capita income including zip codes 75247, 75210, 75215 and 75212 in the City of Dallas with per capita income below $5,500 have a high teen birth rate of more than 41 births per 1000 teens.

Educational Attainment and Teen Birth Rate

According to the third hypothesis, teen births occur more frequently in communities with low educational attainments. Therefore, teen birth rates are expected to be higher in zip codes with high rates of percent less than 9^{th} grade level of education. Less than 9^{th} grade education was positively correlated to teen births rate with a correlation coefficient of 0.26 significant at .05 level (Table 10).

Although the correlation between teen birth rate and low educational level was found to be statistically significant, the correlation is somewhat weak (Figure 16). When Figures 13 and 17 are compared visually, they confirm an association between teen birth rates and percent less than 9^{th} grade education. The mid-eastern portions of the county, areas around Cockrell Hill and South Dallas, have high percent less than 9th grade

education. Percent less than 9th grade education is very high in zip codes 75212, 75211, 75236, 75247, 75224, 75204, 75216, 75214 areas with correspondingly high teen birth rates.

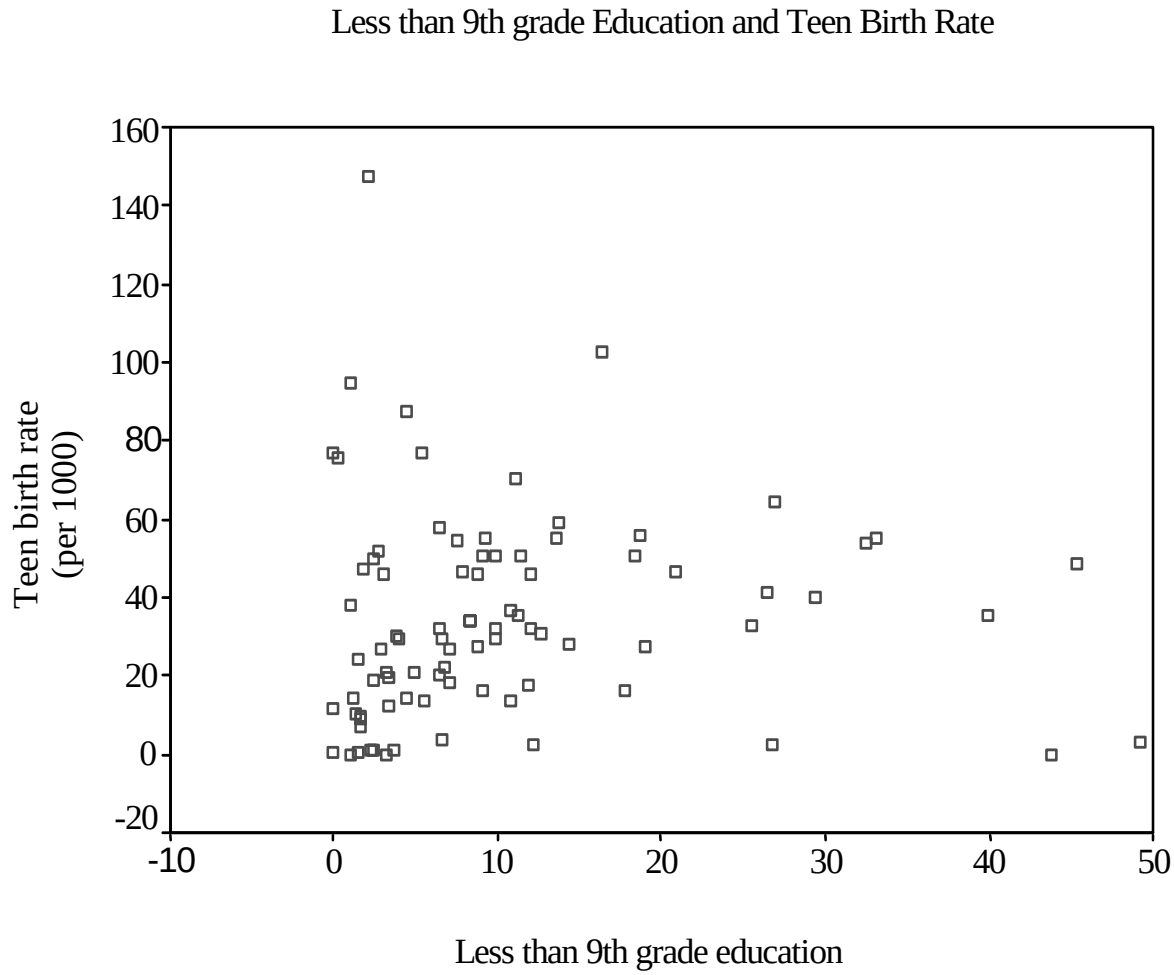

Figure 16. Scatter plot of Less than 9th grade Education and Teen Birth Rate

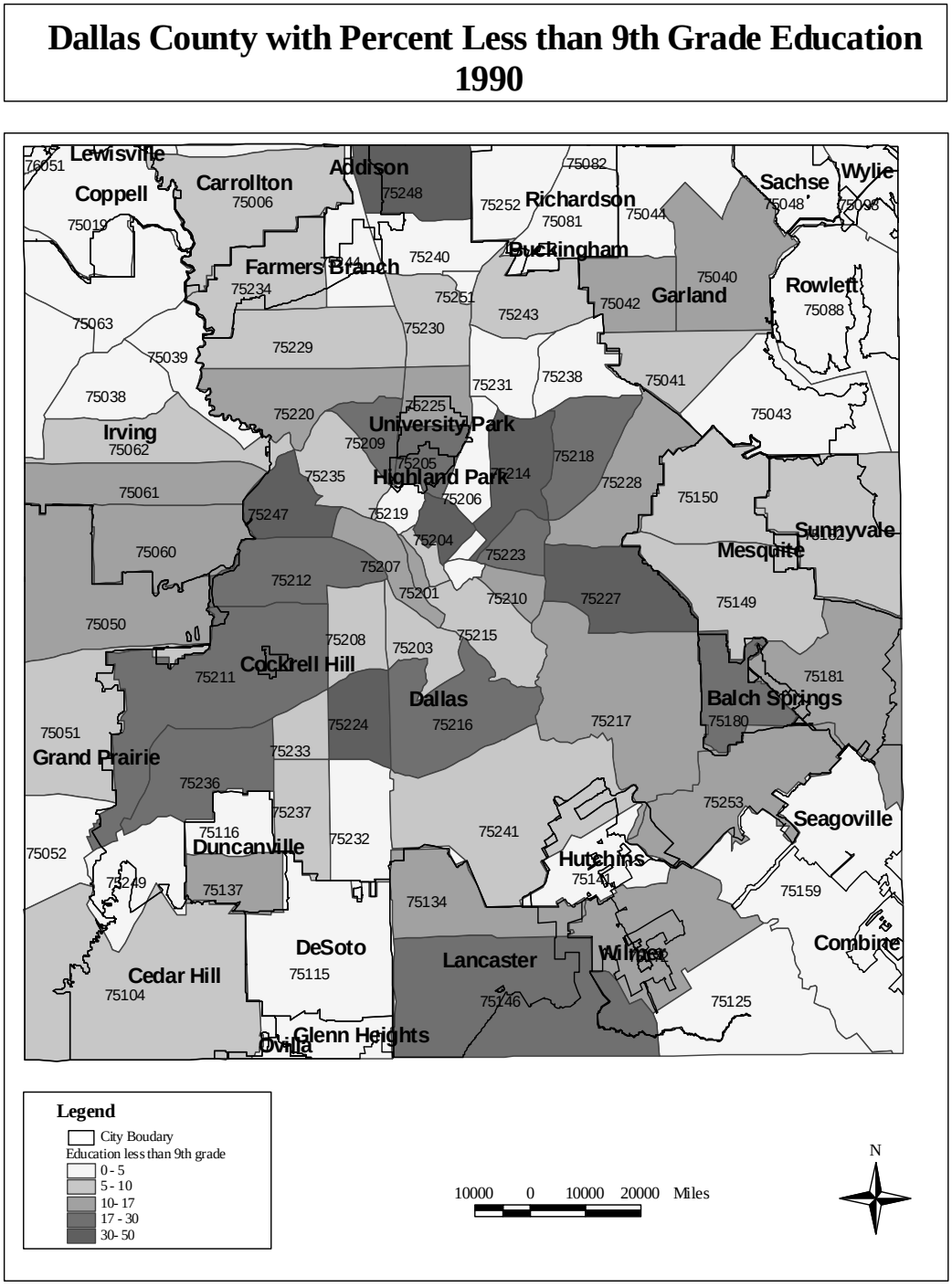

Figure 17. Percent less than 9th grade education distribution for Dallas County, 1990

Race/Ethnicity and Teen Birth Rate

It was hypothesized that Teen births is more common and has developed as a result of an agglomeration of certain racial or ethnic groups in a vicinity. The sensitive subject of teen pregnancy, teen births single parenting and race, is a matter of considerable interest to researchers. Some researchers suggest that, African American women are more likely to be single parents and most teen births occur in African Americans and Hispanics. Teen birth rate was compared against the three races in focus, White, Black and Hispanic population. A high correlation coefficient of .61, the highest positive correlation coefficient, significant at the .01 level, between teen birth rate and the percent Hispanic population was obtained. Generally, zip codes with high percent Hispanic population had higher teen birth rates. The scatter plot (Figure 18) shows a strong positive correlation between teen birth rate and percent Hispanic population.

When Figures 13 and 8 were visually compared against each other a distinct association between teen birth rates and percent Hispanic population was observed. Areas with high percent Hispanic population appear to have correspondingly high teen birth rates. In and around the mid western portion of the county around Cockrell Hill, City of Dallas and the southeastern part around Wilmer, there is a high concentration distribution of Hispanic population with a correspondingly high teen birth rate in these zip codes. For example zip codes 75211, 75212, 75208 and 75235 has more than 50% percent Hispanic population with a high teen birth rate of more than 41 birth per 1000 teens.

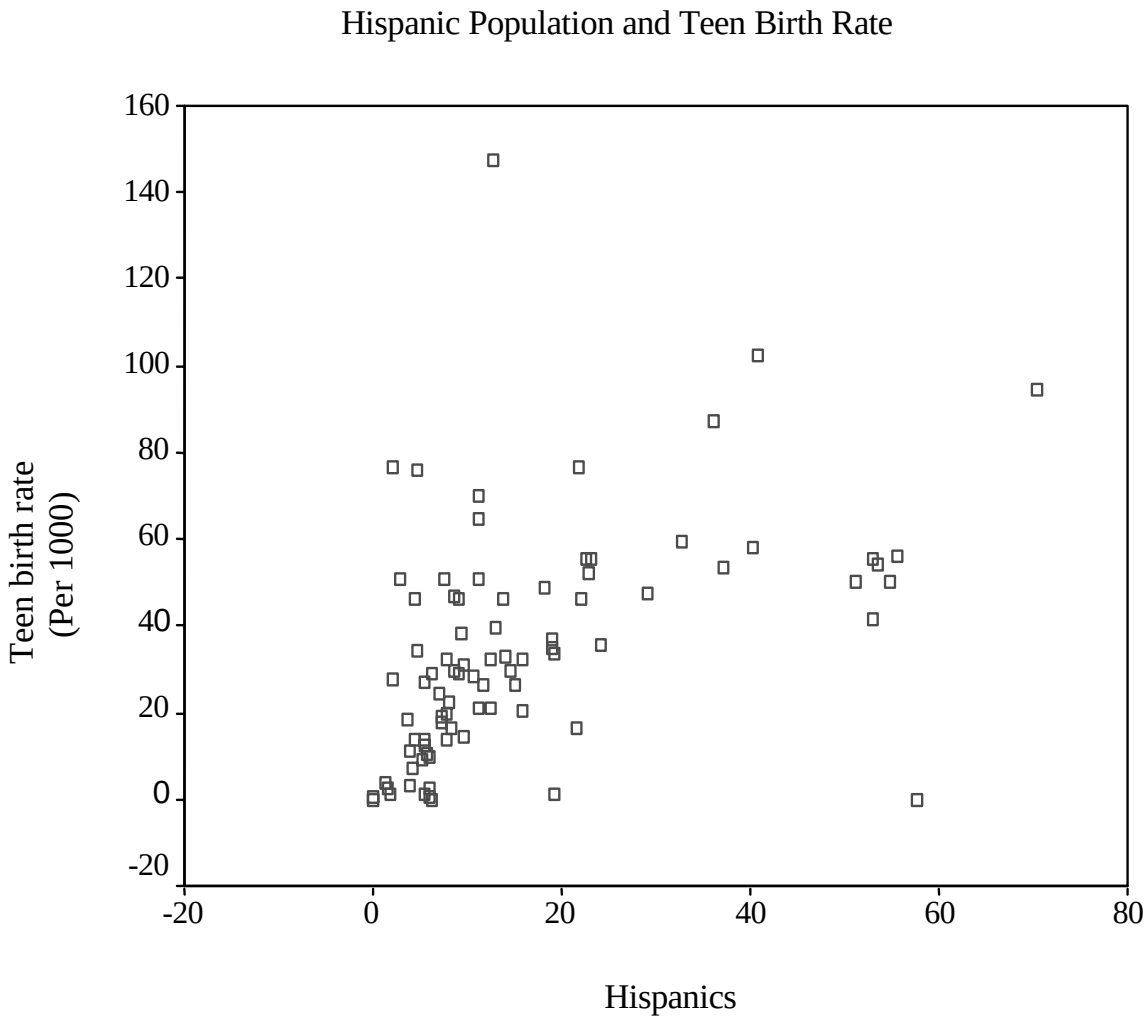

Figure 18. Scatter plot of Hispanic Population and Teen Birth Rate

Teen birth rate against percent White population revealed a strong inverse correlation of -.57, significant at .01 level (2-tailed) (Figure 19). As the White population decreases teen birth rates increases and vice versa.

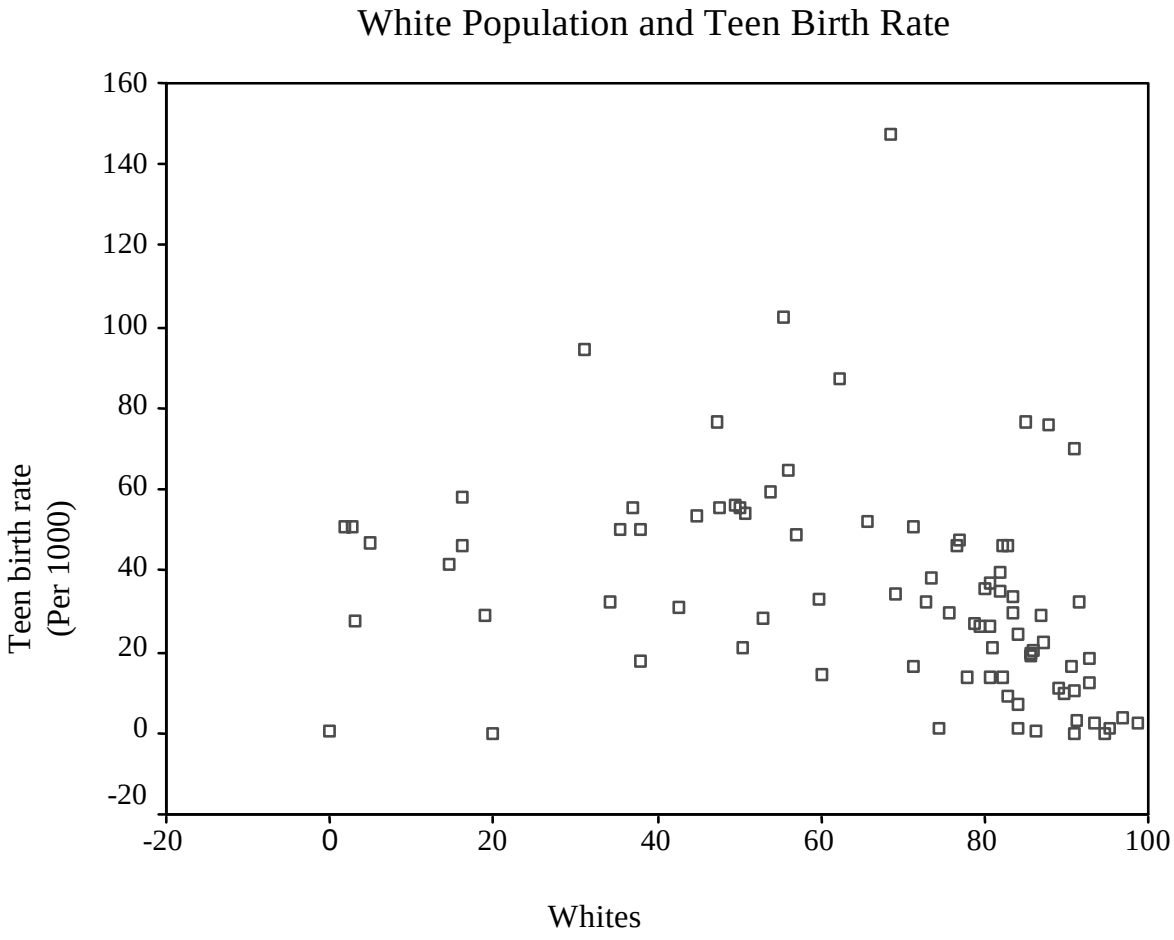

Figure 19. Scatter plot of White population and teen birth rate

The distinct association between Figures 13 and 6 is striking. Zip codes 75019, 75225, 75205, 75048, 75088, 75182, 75248 in Coppell, University Park, Highland Park, Sachse, Rowlett, Sunnyvale and Addison have more than 80% White population. Teen birth rates

in these zip codes are low and range between as 3 births per 1000 teens and 11 births per 1000 teens.

Correlation analysis revealed a positive correlation between teen birth rate and percent Black population of .47, significant at the .01 level (Figure 20). Thus, teen birth rates tend to be higher in zip codes with high percent Black population (Figure 7).

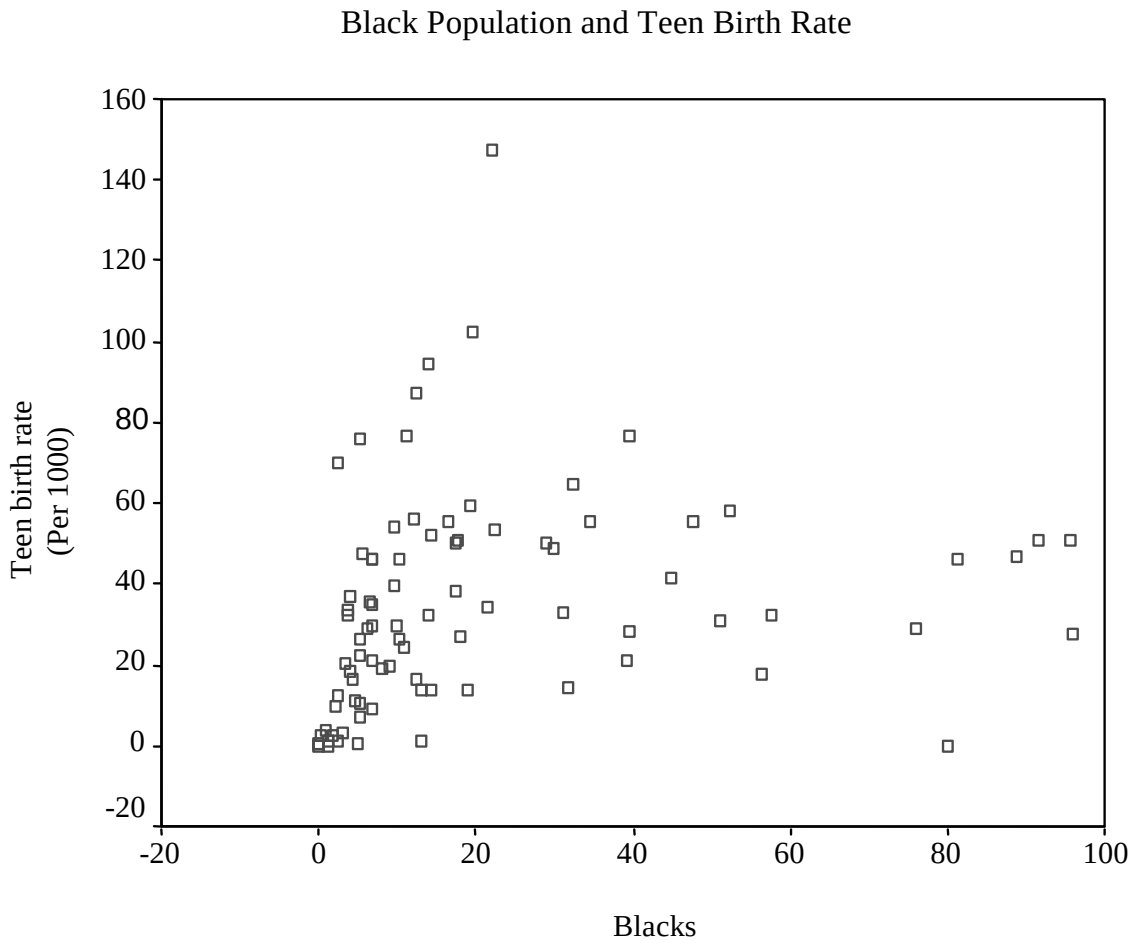

Figure 20. Scatter plot of Black Population and Teen Birth Rate

A visual comparison between Figures 13 and 7 suggests a loose association between teen birth rates and percent black population. Zip codes with high percent Black population appear to have correspondingly high teen birth rates. Percent Black population is concentrated in the mid south part of county in the City of Dallas. Zip codes 75210, 75215, 75241, 75232 and 75237 have percent Black population exceeding 75% with a correspondingly high teen birth rate.

When teen birth rate is compared against percent teen population, a very weak but significant correlation (-.22, significant at the .05 level 2-tailed). Figure 21 shows a scatter plot of the correlation and the weak inverse relationship between teen birth rate and percent teen population. As teen population increases, teen birth rate decreases and vice versa.

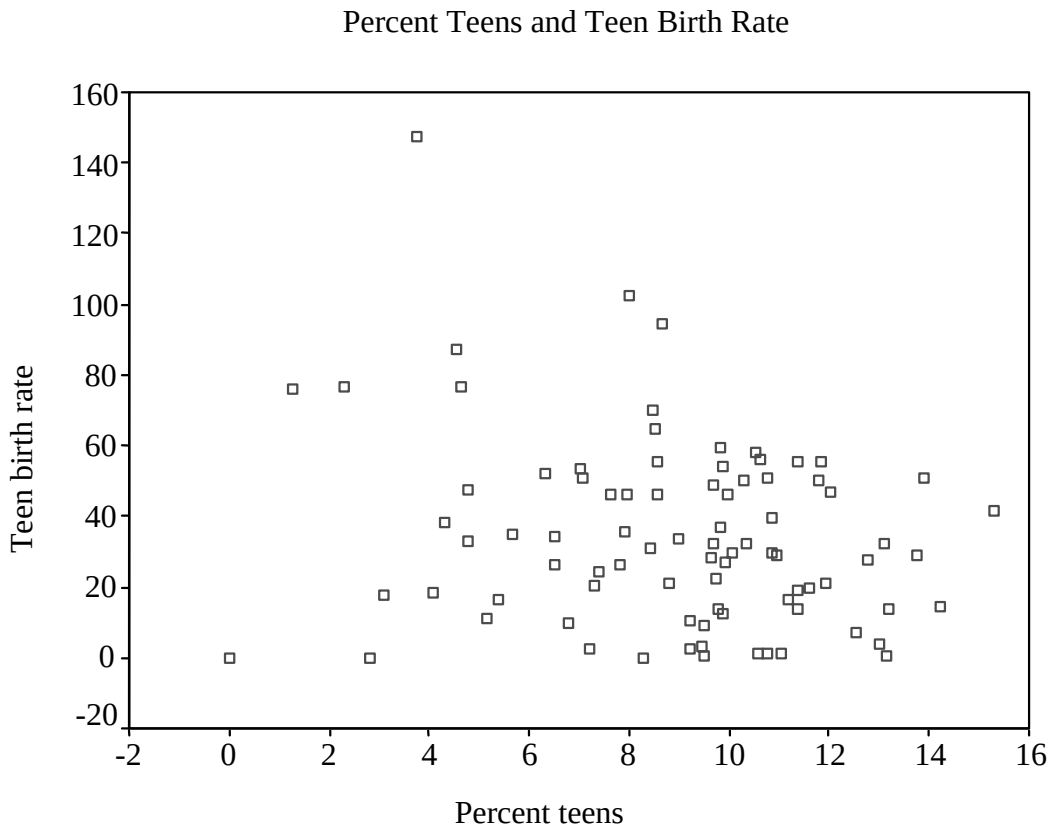

Figure 21. Scatter plot of Percent teens and Teen Birth Rate

Although not very distinct, a visual comparison between figures 13 and 22 reveals an association between teen birth rates and percent teen population.

Percent Teens and Teen Birth Rate, 1990

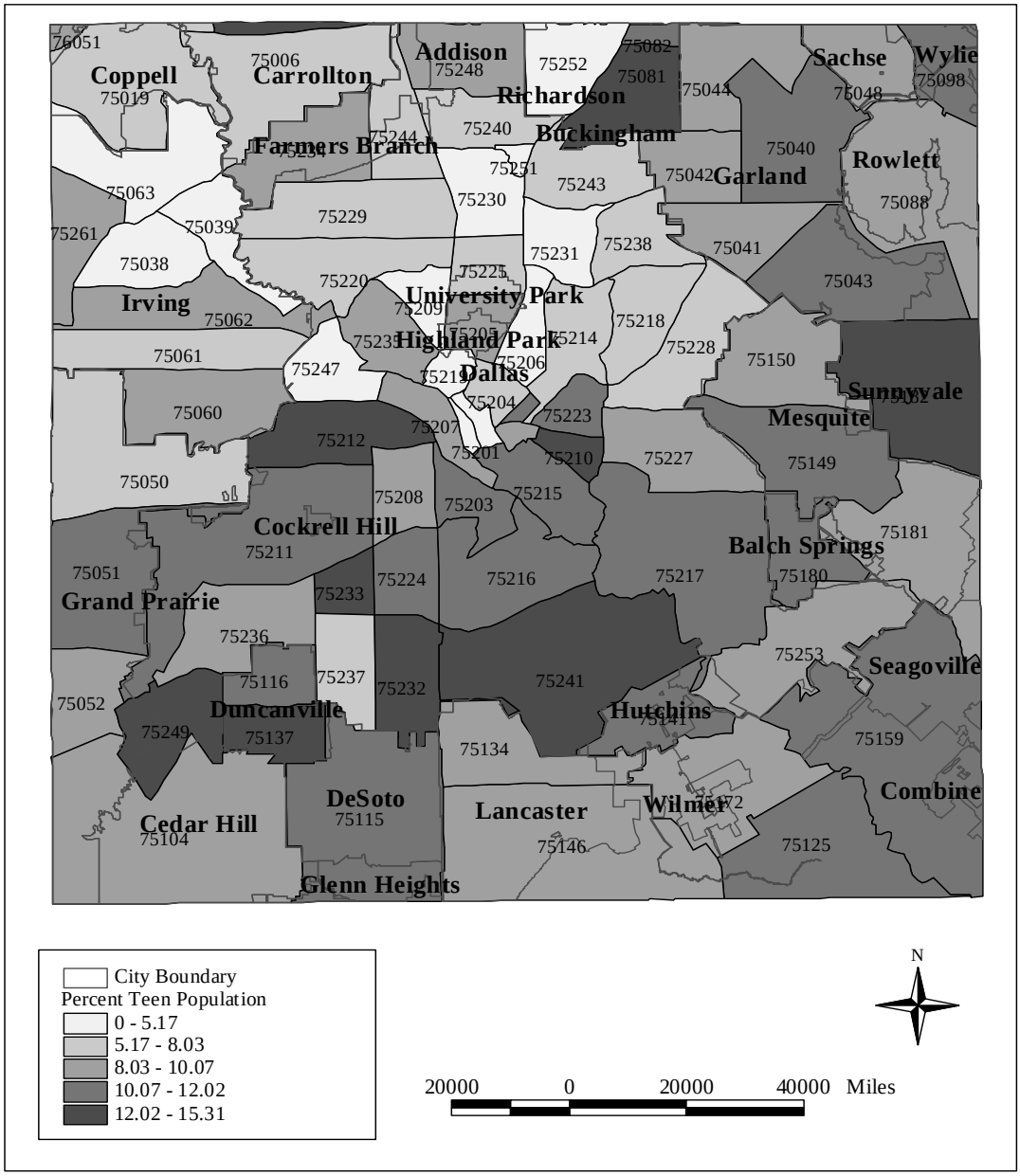

Figure 22. Percent Teen population distribution, 1990

REGRESSION ANALYSIS

To prepare the data for regression analysis all the variables were standardized to bring the data to a similar range of values. Following this five outliers were removed. Three of those outliers were zip codes that were established in 2000 and thus were nonexistent in 1998 the year teen birth data used in this study was compiled. Since no teen birth data was recorded for these areas, the zero birth per 1000 teens recorded is not a true indication of teen births rates in that area for 1998. The other two zip codes, 75231 and 75220 had extremely high teen birth rates, 147.37 and 102.31 births per 1000 respectively.

The resulting regression model, which accounted for 61% of the variation in teen birth rate, was:

Teen birth rate = percent Blacks + percent Whites + percent Hispanics - median household income - per capita income - percent teens.

Independent Variables	**Beta**	**Variable**
Percent Hispanics	0.56	Race/Ethnicity
Percent Whites	0.34	
Percent Blacks	0.50	
Median Household Income	-0.21	Economic
Per Capita Income	-0.15	
Less than 9th grade Education	-0.01	
Percent Teens	-0.45	Teens

Table 11. Regression Model Summary (R^2 = .61)

Beta values indicate race is the most significant variable in explaining teen birth rate (Table 10). Teen birth rates were higher in predominantly Black and Hispanic zip codes and lower in predominantly white neighborhoods. For economic variables, teen birth rates were higher in zip codes with low median household income, low per capita income and high less than 9^{th} grade education. These results support the research hypothesis.

The negative sign of percent teens in the regression model suggests that as the proportion of teenagers increased teen births decreased. This relationship is difficult to explain. It may be that areas with a higher percent of teenagers have better access to services that reduce or prevent teen pregnancy. Furthermore, percent white population is negatively related to percent teens, thus areas with high concentrations of Whites have low concentrations of teenagers. Consequently, it makes sense that such areas would have low teen birth rates. Is it possible that such areas may have better access to contraceptive services that effectively limit teen births? Clearly this relationship merits further research.

CHAPTER 7

DISCUSSION AND CONCLUSION

The county level analysis for the 16 counties in North Central Texas indicated that, there was no statistical difference between teen birth rates for urban and rural counties. However, on the individual county level, rural counties generally have higher teen birth rates than urban counties. The three counties with the highest teen birth rate in the region, Ellis, Palo Pinto and Navarro, are all rural counties. From the correlation analysis economic variables was a significant factor in determining total teen birth rates in region. For Ellis County, the county with highest teen birth rate in the region in 1998, births are higher for teens between ages 10 to 14 years than between 15 to 17 years and 18 to 19 years. Because most parts of Ellis County are rural with farm and ranch communities, the high teen birth rate may be due to early births and early marriages typical of farming communities.

Several conclusions can be drawn from the correlation and regression analysis results. Low economic status emerged as a significant factor in teen birth rates with higher than average teen birth rate correlating highly with low median household income and low per capita income. On average, zip codes in the City of Dallas have higher teen birth rates than other cities in Dallas County. High teen birth rates tend to be concentrated in zip codes with high rates of poverty and low education, and births are often to single and unmarried teen mothers. In such areas the appropriate role of parents, particularly fathers, in teen homes may not be properly defined and provision by the father for the

mother and child may often be temporary shifting child costs to the public (Winegarden, 1988). Teen mothers quickly realize that they are the sole breadwinners for their children when the father of their child refuses to take responsibility and often are themselves high school dropouts.

Previous research suggests that teen birth rates are higher in areas with a high concentration of single-parent, female-headed households but that did not hold true for Dallas County teen births in 1998. There was no significant correlation between teen birth rate, and percent female-headed households with children less than 18 years old. Similarly, correlation between percent teen birth and single parent male-headed households was not significant. It is widely believed that marriage rates have declined and divorce rates have increased across all ages over the last thirty years contributing to an increase in single headed households. For instance, in 1998, 86,625 divorces were reported to the Bureau of Vital Statistics in Texas, an increase from 51,530 reported for since 1970. In contrast the marriage rate was about 8.4 per 1,000, the lowest level ever recorded since 1968, continuing the downward trend of the 1990's. The highest level of marriage ever recorded was 13.2 in 1981. An increase in marriage postponement and single parenthood perhaps indicate permanent departure from the ideal historical American marriage and parenting. Cohabitation and partial co-habitation household

are common for all races in the U.S. and have increased over the years.

What is peculiar in this research is that zip codes with the high rate of single parent headed households, especially female-headed households did not necessarily have low-income status. There was no significant correlation between female-headed household, male-headed household, median households income, per capita income and teen birth rate. Therefore, no significant difference exists between teen birth rates in double-parent households and single parent households. However, there was a relatively high and significant correlation between female-headed household, male-headed household and public assisted households with a significant coefficient of 0.69 and 0.57 respectively. Both correlations were significant at the .01 level. Thus, single parents homes with children less than 18 years are more likely to receive public assistance.

The relationship between teen birth rate and level of education was highly significant. This result agrees with the initial hypothesis of teen birth rates being higher in zip codes with high percent of people with less than 9^{th} grade education. Formal education, particularly for women, has the ability of postponing age at first birth to a later and more matured age. For example, according to the U.S. Department of Education, pupils normally spend from 6 to 8 years in the elementary grades, preceded by 1 or 2 years in nursery school and kindergarten. A 4 to 6 year program in secondary school follows the elementary school program. Pupils normally complete the entire program through grade 12 by age 17 or 18. High school graduates who decide to continue their education may enter a technical or vocational institution, a 2-year college, or a 4-year college or university. The lengths of study for graduate and professional schools are even

longer (U. S. Department of Education, Digest of Educational Statistics, 1998). This puts the approximate age at first birth for a woman who had had at least an associates degree from a tertiary institution would be between ages 20 years and 22 years, that of a bachelors degree holder would be between 22 and 24 years and that of a masters degree holder would be between 24 and 27 years. Consequently by implication, as a woman's education increases, vulnerability to early childbirth decreases and the problem of teen birth becomes almost redundant.

Race/ethnicity appears to be a very significant determinant of teen birth rates. Based on the correlation and regression analysis, it appears that vulnerability to teen birth is higher in Black and Hispanic communities than in White communities. Hispanic communities appear to be most vulnerable. Economically, most Black and Hispanic teens are disadvantaged because they come from communities with low median household income and per capita income. Socially, Black and Hispanic teens are disadvantaged because they make up the largest minority group. This may indicate an association between ethnicity and low income. Research suggests a reduction in early childbirth will eliminate some of the powerful effects of poverty on these teens. But, is poverty the direct result of teen birth or is teen birth the result of poverty?

Critics often argue that research on teen births has overstated the negative consequences of teen childbearing by ignoring the fact that teens that had had a birth irrespective of race/ethnic background are from the more economically disadvantaged portion of society. Other critics have also argued that, the inability of researchers to treat the consequences of low economic status separate from those of ethnic background for

teen birth has resulted in racial/ethnic determinants of teen birth being overemphasized. Economic and race/ ethnic determinants of teen birth are equally important and to understand each factor one will have to fully examine both. Economic, social and educational determinants of teen births appear to influence teens in different degrees and one cannot fully understand differences in teen birth rate in different communities without taking a comprehensive approach.

What services are available for preventing teen births and where are they located? Dallas County has about 50 School-Age Pregnancy Prevention Services that offer programs, services and up to date information on teen pregnancy prevention, contraceptives and parenting. Most of these facilities are state agencies with a few private non-profitable organizations such as YMCA. The state agencies include Independent School Districts (ISD), Hospital and Clinics and Texas Department of Health and Human Services. Figure 23 presents existing School-Age Pregnancy and Prevention services locations. Teen Pregnancy Prevention Service facilities are concentrated in central Dallas County, specifically in zip codes 75235 (7 facilities), 75204 (5 facilities) and 75212 (4 facilities). On the average, zip codes that have Teen Pregnancy and Prevention Services have one facility on site. Zip codes 75050 and 75201 have 3 Teen Pregnancy and Prevention Service facilities in all.

One would assume that Teen Pregnancy and Prevention Service facilities would parallel the geographic distribution of teen birth rates. That was not the case for Dallas County. Zip code 75231 the highest teen birth rate of 147.31 per 1000 and yet had only one Teen Pregnancy and Prevention Service facility. Of all the zip codes with teen birth

rate higher that 70 births per 1000 (75220, 75226, 75219, 75201, 75039, 75063 and 75253) only zip codes 75201 and 75219 had Teen Pregnancy and Prevention Service facilities. Thus access to services may be a limiting factor.

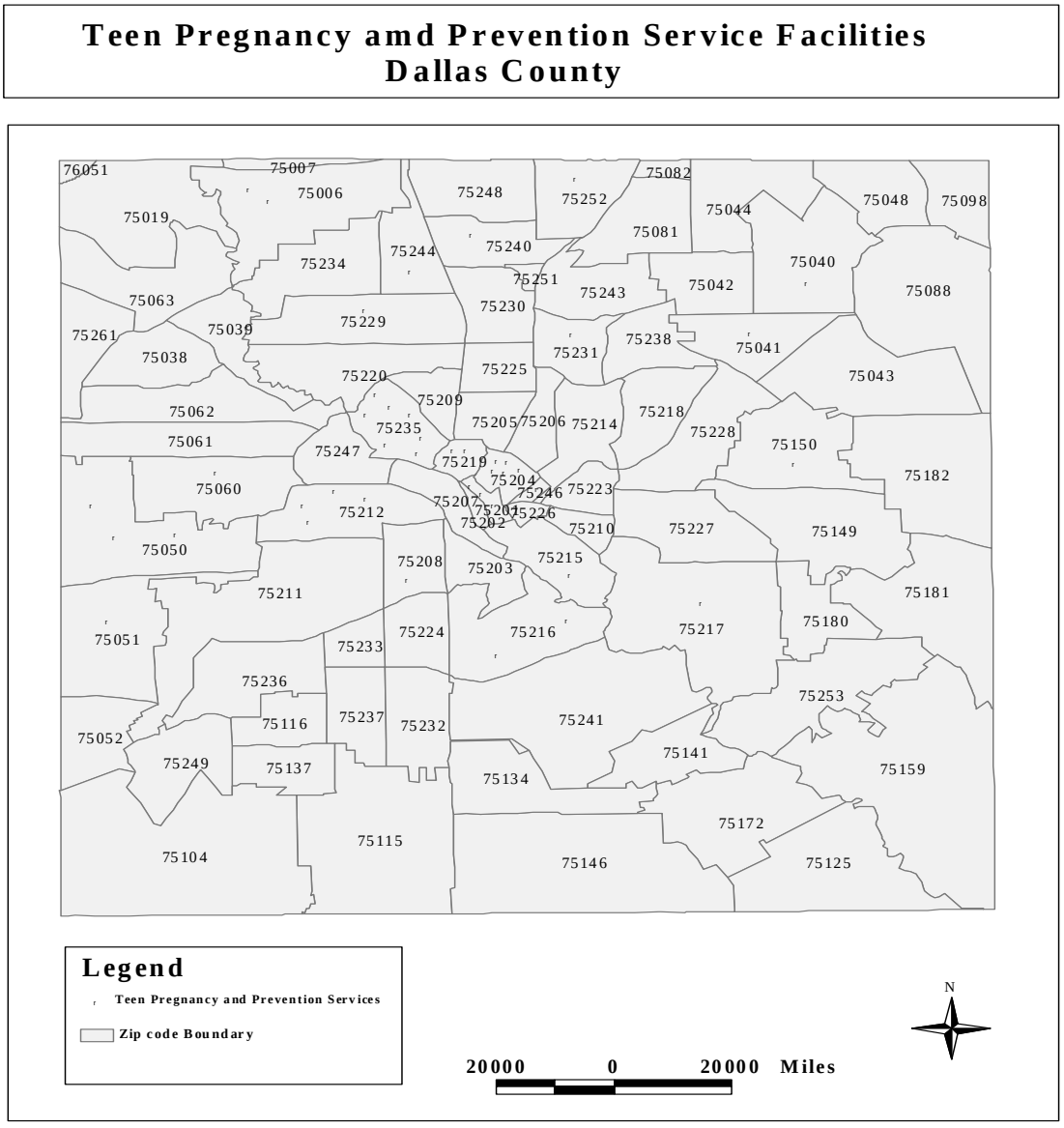

Figure 23. Pregnancy and Prevention Services Locations

Although Teen Pregnancy Prevention Services in Dallas County provide programs and services to teens, information-based individual sexual behavioral interventions, including distribution of contraceptives, may not be adequate to induce changes in teen's attitude towards sexual intercourse and teen birth. A comprehensive intervention approach that addresses these issues while empowering teens to prevent unplanned pregnancy may be required.

Suggestions for teen pregnancy/birth prevention services can be categorized into three main areas, Education, Empowerment and Employment. Under Education/ Empowerment, general measures should be implemented to improve quality of education in high-risk (teen birth) communities. This would include on-going personal development programs and instruction on the need to delay childbirth for "better life" provided by schools, civic centers and churches for adolescents between the ages of 10 to 19 years. To ensure full participation by all teens of school going age, these programs should be included in the regular curriculum and should aim at improving the image or self-esteem of the pupil. Outreach programs should aim at reaching out to teen mothers and school dropouts. Childcare services and transportation services should be provided freely as an incentive for teens that had had a birth provided they participate in these programs.

The need to belong or "peer pressure" have often landed teens in trouble with parents, the law or those in authority. Peer counseling on sexuality, pregnancy, early parenthood and related problems, if readily available in both Spanish and English encourage teens to resist peer pressure, and seek counseling with minimum parental or guardian interference.

Teen Pregnancy Prevention Facilities and Services should be located in communities that have high teen birth rates and are medically underserved especially for family planning needs. Primary health care workers in these facilities should provide outreach programs including, television and brochures to vulnerable teens and provide free or subsidized family planning services such as contraceptive use, pregnancy testing and pregnancy termination.

Employment seminars or information should be provided on possible employment prospects or opportunities available to teens and teen mothers especially for high school graduates so that they can earn a decent income and achieve greater independence and control over their life's instead of depending on the family or government assistance.

Nevertheless, this research has its own limitations. Zip code data for teen births in Dallas County was aggregated and most of the detail such as birth by mothers age, marital status and race was lost. Different spatial units (County level and Zip code level) yielded slightly different statistical results reflecting the modifiable areal unit problem of spatial analysis (Fotheringham and Wong, 1991). In effect, a different zonal configuration such as block group, which is finer than zip code level data, may produce different statistical results and interpretation. Moreover in focusing on spatial variation, other factors such as religious belief that impact teens' sexual behavior and attitude towards abortion and birth have not been addressed.

CONCLUSION

Although sexual intercourse may be found among some adolescents in all racial groups, teen birth is more common in minority groups especially Blacks and Hispanics and the economically disadvantaged. Sexual behavior, the primary focus of teen birth prevention is deeply rooted in teen's individual behavior, peer relationships, socio-cultural factors, and environmental and economic processes. For instance, even with similar parental educational background, occupation and incomes, White, Black and Hispanic children are socialized differently and certain societal sanctions or prejudices and expectations may contribute to the variations in teen birth rates among races.

APPENDIX 1

DALLAS COUNTY PERCENT RACE BY ZIP CODE 1990

CITY NAME	ZIPCODE	% WHITES	% BLACKS	% HISPANICS
CARROLLTON	75006	79.32	5.34	15.04
CARROLLTON	75007	86.44	4.95	5.85
COPPEL	75019	89.84	2.14	5.90
IRVING	75038	73.36	17.32	9.48
IRVING	75039	84.93	11.17	1.95
GARLAND	75040	72.73	13.87	15.92
GARLAND	75041	82.78	6.92	13.81
GARLAND	75042	75.62	6.95	14.51
GARLAND	75043	85.68	8.08	7.31
GARLAND	75044	82.95	6.76	5.29
GARLAND	75048	92.74	2.52	5.47
GRAND PRAIRIE	75050	80.00	6.39	24.09
GRAND PRAIRIE	75051	71.44	12.28	21.45
GRAND PRAIRIE	75052	82.13	10.10	9.19
IRVING	75060	80.76	3.98	18.86
IRVING	75061	76.48	6.76	22.17
IRVING	75062	80.89	6.77	12.41
IRVING	75063	87.72	5.20	4.57
RICHARDSON	75081	84.05	5.37	4.18
RICHARDSON	75082	84.12	2.34	1.80
ROWLETT	75088	90.99	5.20	5.64
WYLIE	75098	95.30	1.25	5.46
CEDAR HILL	75104	80.72	14.30	7.71
DE SOTO	75115	77.78	18.92	4.54

DUNCANVILLE	75116	85.53	9.03	7.92
FERRIS	75125	74.34	12.94	19.23
LANCASTER	75134	53.04	39.53	10.70
DUNCANVILLE	75137	82.27	12.95	5.54
HUTCHINS	75141	50.59	39.20	11.21
LANCASTER	75146	78.77	18.17	5.54
MESQUITE	75149	86.84	6.31	9.17
MESQUITE	75150	87.25	5.35	7.98
SEAGOVILLE	75159	83.39	9.89	8.61
WILMER	75172	53.98	19.41	32.74
MESQUITE	75180	81.94	9.50	12.93
MESQUITE	75181	91.72	3.70	7.70
MESQUITE	75182	96.80	0.75	1.30
DALLAS	75201	47.46	39.57	21.94
DALLAS	75202	37.86	56.37	7.20
DALLAS	75203	16.09	52.42	40.19
DALLAS	75204	44.74	22.30	37.20
DALLAS	75205	93.42	1.85	6.04
DALLAS	75206	76.98	5.63	29.12
DALLAS	75207	42.76	51.12	9.51
DALLAS	75208	50.77	9.61	53.43
DALLAS	75209	59.77	31.00	13.98
DALLAS	75210	1.70	95.73	2.85
DALLAS	75211	49.49	12.25	55.53
DALLAS	75212	14.58	44.90	52.91
DALLAS	75214	81.80	6.79	19.07
DALLAS	75215	2.75	91.59	7.51
DALLAS	75216	4.92	88.81	8.69
DALLAS	75217	50.22	34.45	22.99
DALLAS	75218	90.55	4.17	8.37
DALLAS	75219	62.38	12.51	36.23
DALLAS	75220	55.39	19.61	40.82

DALLAS	75223	35.45	28.85	51.14
DALLAS	75224	37.14	47.53	22.55
DALLAS	75225	98.91	0.14	1.46
DALLAS	75226	31.08	13.97	70.42
DALLAS	75227	57.07	29.95	18.22
DALLAS	75228	71.26	17.57	11.24
DALLAS	75229	85.89	3.29	15.91
DALLAS	75230	92.90	3.97	3.55
DALLAS	75231	68.52	22.10	12.69
DALLAS	75232	18.99	76.13	6.23
DALLAS	75233	34.34	57.69	12.43
DALLAS	75234	83.40	3.82	19.33
DALLAS	75235	47.67	16.53	52.92
DALLAS	75236	55.94	32.25	11.20
DALLAS	75237	16.16	81.17	4.41
DALLAS	75238	83.99	10.81	6.93
DALLAS	75240	65.72	14.30	22.93
DALLAS	75241	3.04	95.86	1.99
DALLAS	75243	69.01	21.45	4.58
DALLAS	75244	80.57	10.10	11.58
DALLAS	75246	37.83	17.55	54.93
DALLAS	75247	19.81	80.19	57.55
DALLAS	75248	91.32	3.01	3.80
DALLAS	75249	60.12	31.65	9.63
DALLAS	75251	90.91	0.00	0.00
DALLAS	75252	89.17	4.67	3.87
DALLAS	75253	91.10	2.32	11.09
DALLAS	75261	0.00	0.00	0.00
GRAPEVINE	76051	94.79	1.34	6.13

Table 12. Dallas County Zip codes with percent race distribution

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