

## Births to Teens Older and Younger Than 17 Years in San Bernardino County and California: Variables Associated with Infant Mortality and Survival

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### Abstract

**Objective:** The purpose of this cohort, descriptive study was to attempt to understand the variables associated with discordant infant mortality among teenagers 17-19 years old whose infants demonstrated higher mortality than infants of teenagers who were younger than 17 years old in San Bernardino County, California. The intent was to elicit further research and/or define appropriate interventions for teen mothers within the age range 17-19 years. **Methods:** Data was abstracted from an electronic infant mortality data set, the State of California Birth Cohort File in which birth records from San Bernardino County for the period 1989 through 1993 were matched with mortality records. **Results:** The data showed that infants of white teens within the 17-19 age groups were more likely to have higher infant mortality rates when compared to their younger peers. Infant mortality rates among offspring of Hispanic and black teenage mothers showed no discrepancy between the two groups nor between county and state rates. **Conclusions:** Further study is needed to answer why infants of white teen mothers in the 17-19 age groups have higher mortality rates. There is also a need to review the services rendered to pregnant and parenting adolescents in San Bernardino County. In addition, very low birth weight infants were much more likely to die when born to older teens than when born to younger teens.

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### Introduction

Infant mortality rate (IMR) has been declining in the United States. In 1996 the infant mortality rate declined to 7.2 per 1,000 live births. This reduction was seen nationwide in both white and black infants. However, there are still concerns with infant mortality and low birth weight infants among blacks (Guyer, et. al. 1997; Guyer, et. al.1999; Ventura, et. a. 1997). In New York, between 1988-1989 and 1992-1993 there was a decline in infant mortality rate of 27.4% among whites, 24.8% among Hispanics, and 22.7% among blacks. For this same group, mortality rates among very low birth weight infants, those less than 1500 grams, also declined by 27.8% among whites, 19.3% among Hispanics and 16.6% among blacks (Racine, et. al 1998). MacDorman and Atkinson (1998)

demonstrated from a linked birth/infant death data set for 1995, that Asian and Pacific Islander mothers had the lowest infant mortality rates. Hispanic mothers, not of Puerto Rican descent had infant mortality rates that were comparable to whites.

Teen birth rate in general continues to decline, and there was significantly so for teens within the age group of 15-17 years old. In spite of this decline, infant mortality still poses an important public health problem that warrants our attention. Women under 20 years tend to have an increased risk of low birth weight babies and higher infant mortality (Mathews, Menacker, & MacDorman, 2002; National Center for Health Statistics, 2002), and there are still disparities in infant mortality among blacks and whites; black

teens have a higher risk for both LBW and VLBW when compared with whites (MMWR: Morbidity & Mortality Weekly Report, 2002; Carmicheal & Iyasu, 1998).

There is an association between infant mortality and low birth weight. The lower the birth weight of infants the higher the expectation of mortality, so one can expect to see an increase in infant mortality with a corresponding decrease in birth weight (Horbar, et. al. 1998; Gould, et. al. 2003; Leslie, et. al. 2003).

Girls in their teen years are of higher risk of having very low birth weight infants when compared with adult mothers. These very low birth weight babies are more likely to die during their first year of life (Fraser, Brockert, & Ward, 1995). Infant mortality rates vary from state to state and some states with a larger black population present higher infant mortality rates (Bird & Bauman, 1998).

Reichman and Pagnini (1997) using vital statistics data from New Jersey did not find older teenage white mothers to be of any significant risk for delivering low birth weight babies. Among black women, however, teens 15-19 years old were of lower risks of delivering low birth weight babies when compared to black women in their twenties. Results of a study conducted in Arizona by Miller, lesser & Reed (1996) from 1989-1993 showed that adolescents younger than 18 years old gave birth to very low birth weight babies at a disproportionately higher rate than older teens.

San Bernardino County, when compared with other counties in California, has one of the highest infant mortality among teen mothers 17-19 years old. The goal of this research was to understand the dynamics of certain variables on the mortality of infants born to teenage mothers and to ascertain why infant mortality of mothers under 17 years old was much lower than the mortality of infants of mothers 17-19 years old.

## **Methodology**

### **Study Population**

Our study population consisted of all children born to mothers less than 20 years old in San Bernardino County and the State of California, during the years 1989-1993. The population of primary concern, however, was the teen mothers in San Bernardino County.

### **Data Collection/Sources**

The electronic Birth Cohort Files of the State of California, Department of Health for the years 1989-1993 were used for abstracting data. This data set was created by linking the death certificates to their birth certificate in the state in which they were born, wherever they died in the United States. Based on this information, computer-generated data was obtained from the San Bernardino Department of Public Health, Program Analysis and Statistics Program, for the period 1989 through 1993.

We examined nine Birth Certificate variables to find out which one(s) might explain the difference in mortality of infants born to teen mothers 17-19 years old in San Bernardino County. These variables included race/ethnicity, type of institution in which the baby was delivered, education of the deceased infant=s mother and father (where available), birth weight category, the trimester in which prenatal care began, the number of prenatal visits, source of payment for prenatal visits, and source of payment for delivery.

### **Data Analysis**

Two sets of analyses were done. First, infants of 17-19 year old teens in San Bernardino County were compared with infants of 17-19 year old teens from the rest of the state. Second, infants of 17-19 year old teen mothers were compared to infants of teens under 17 years old in San Bernardino County. Infant mortality rates were calculated for all groups with 10 or more deaths. Infant mortality rates of the under 17 age group in San Bernardino County were used as a standard to calculate excess mortality in the 17-19 age group. Chi Square analysis was

employed to compare infants from different demographic groups within the county and the state for the 5-year period 1989-1993.

## Results

### Demographics

The estimated 1994 population for San Bernardino County was 1,650,600. There was a diverse ethnic group comprising of 62% whites, 27% Hispanics, 8% blacks and 5% other (1% Native Americans and 4% Asian/Pacific Islanders). Of this population, five percent were children under five years and 15% adolescents between the ages of 10 and 19 years. The estimated annual median income was approximately \$37,000. The infant mortality rates per 1000 live births for mothers ages <16 years, 16 years, 17 years, 18 years and 19 years respectfully, were: 10.1, 9.5, 14.3, 12.9, and 11.4 for the period 1989-1993. The infant mortality rates per 1000 live birth in the state of California for the same ages and during the same period were 12.8, 10.7, 11.2, 9.6 and 9.2.

### Birth Weight

Birth weight categories were given as very low birth weight (VLBW), defined as 1500 grams or less; low birth weight (LBW) and normal birth weight (NBW). When all low birth weight births were considered together, chi square

analyses demonstrated a significant difference between the two age groups. The tendency was for younger teens to have low birth weight and very low birth weight births ( $p= 0.001$ ), yet these younger teens had lower infant mortality rates. Infants born to mothers in San Bernardino County and the rest of the state of California within the 17 - 19 age group had the worst infant mortality rate when compared to infants born to mothers under 17 years old during the period 1989-1993. A major finding of this study was the differences in infant mortality among very low birth weight (VLBW) babies. Very low birth weight babies born to mothers in the 17-19 age group were 1.7 times more likely to die before their first birthday than very low birth weight babies born to mothers younger than 17 ( $p=.008$ ).

Infant mortality per 1000 live births in VLBW babies of mothers 17-19 years old in the county was 432, and 260 in those whose mothers were younger than 17 years. At the state level there was hardly any difference in the IMRs of very low birth weight babies born to mothers of the two age groups. The relative risk is 1.66 with a p-value of 0.008. Infants of the 17-19 age group had a 66% increased risk of deaths from VLBW babies compared to mothers under 17 years (Table 1).

Table 1  
Birth Weight (VLBW) by Age Category

Mother's Residence	Mothers Aged < 17 Years			Mothers Aged 17-19 Years		
	Survive	Infant Death	Infant Mortality Rate	Survive	Infant Death	Infant Mortality Rate
San Bernardino County	54	19	260.3	147	112	432.4
California (excluding San Bernardino County)	696	325	318.3	2,050	1,011	330.3

Note: Infant mortality rate defined as infant deaths per 1,000 live births.  
Source: California Department of Health Services, Birth Cohort Files, 1989-1993. Prepared by San Bernardino County Department of Public Health.

A little over 88% of all excess deaths in infants born to teens 17-19 years old were attributable to the high death rate among VLBW infants. Nearly 47% of VLBW infants born to white mothers in the 17-19 year old age group died within the first year. These deaths accounted for 43% of the total infant deaths in this age group and excess deaths of 51. Of these 51 excess deaths 88% were in the VLBW category. In the normal birth weight category there was no difference in infant mortality rate between infants of younger and older teens.

**Race/Ethnicity**

Among all ethnic groups in San Bernardino County, there were no differences in the infant mortality rates of infants born to mothers 17-19 years as compared to infants born to mothers

under 17 years old except in Whites. Infants born to white teen mothers aged 17-19 years old experienced mortality rates more than twice the rate of infants born to whites younger than 17 years old ( $R^2=2.25$ ,  $p = 0.022$ ). In California as a whole, however, differences in infant mortality rates were noted in Hispanics ( $R^2=1.25$ ,  $p<0.001$ ) and Other, essentially Asians ( $R^2=1.38$ ,  $p=0.048$ ). In San Bernardino County, there was no difference in infant mortality between younger and older Hispanic teens, or between younger and older African-American teens. The differences observed in the county as a whole could not be accounted for by these two groups of teens. When comparing Whites, 17-19 year olds in San Bernardino County and the State, the infant mortality rates were higher in the county (Table 2).

Table 2  
Death Rate by Race and Age

Mother's Race/Ethnicity	Mothers Aged < 17 Years			Mothers Aged 17-19 Years		
	Survive	Infant Death	Infant Mortality Rate	Survive	Infant Death	Infant Mortality Rate
White	13	2	133.3	55	48	466.0
Hispanic	25	10	285.7	54	35	393.3
Black	15	4	210.5	33	27	450.0
Other	1	3	750.0	5	2	285.7
All Race/Ethnicities	54	19	260.3	147	112	432.4

Notes: San Bernardino County resident births of birth weight < 1,500 gm. Infant mortality rate defined as infant deaths per 1,000 live births.

Source: California Department of Health Services, Birth Cohort Files, 1989-1993. Prepared by San Bernardino County Department of Public Health.

Mortality for infants born to teen mothers under 17 years of age (41 deaths in 4210 deliveries, i.e. 9.74/1000 live births) was much better than those born to teen mothers within the age group 17-19 years (227 deaths in 18074 deliveries i.e. 12.56/1000 live births).

**Place of Delivery**

In San Bernardino County, teen mothers gave birth at government hospitals, private hospitals, or at home. Most babies were delivered at private facilities. There were no significant differences in infant mortality rates of infants born to mothers in either age group irrespective of place of delivery (Table 3).

Table 3  
Distribution of Births by Birthplace

Birthplace	Age of Mother		
	<17 Years	17 - 19 Years	Total Under 20
Home/Residence	12	62	74
Government Hospital	763	3,461	4,264
Private Hospital	3,429	14,503	17,932
Other/Unknown	6	48	54
Total	4,210	18,074	22,324

### Trimester Entering Prenatal Care

Time of entry into prenatal care by the older teens (17-19 age group) was associated with decreased infant mortality when compared to no care at all. There appeared to be some differences in IMRs relative to the time when care began. Teen mothers under 17 years old who received prenatal care during the first trimester had better infant mortality rates ( $p < 0.001$ ) than those who had no care. Beginning care in the second and third trimesters was also associated with reduced infant mortality when compared to those who received no care.

The proportion of teen mothers with no prenatal care was 3.54% in the under 17 years old age group and 3.04% in the 17-19 years old age group. The IMR for the 17-19 year old age group with no prenatal care in the county (56.20) was higher than that for the state (31.99).

### Number of Prenatal Visits

In San Bernardino County, the number of prenatal visits was associated with infant mortality and may help to explain why teen mothers 17-19 years old had higher infant mortality rates when compared to the state and to teen mothers younger than 17 years old. Mothers who had less than five visits during the gestation period had higher infant mortality rates. Those mothers who had less than five visits during gestation had higher infant mortality rates regardless of age.

Teen mothers younger than 17 years with less than five prenatal visits had an infant mortality rate of 27.64/1000 live births. Those within the same age group with five to nine and 10+ visits had 6.77 and 6.82 deaths/1000 live births respectively. Teen mothers within the 17-19 year old group who had less than five prenatal visits had a higher IMR (43.49/1000 live births) than those who were under 17 years old. The rates were also higher for those who had 5-9 visits (12.00/1000 live births), but not for 10 or more visits (5.15/1000 live births).

It should be noted that the IMR in the less than 17 years old age group was lower in the county when compared to that of the state. However, the numbers involved at the county level were smaller than those in the state and therefore, not significant. Also in the county the percentage of teen mothers 17-19 years old who received prenatal care was lower (48.3%) than the state (53.9%).

### Source of Payment for Prenatal Visits and Delivery

In San Bernardino County, the source of payment for services and delivery was not related to infant mortality in teen mothers. There was no association with source of payment and higher infant mortality rates among teens 17-19 years old.

### Discussion

A complete analysis of deaths of infants of teen mothers was done covering a five-year period. This study has clearly shown that in San

Bernardino County, VLBW babies born to teens 17-19 years old were more likely to die before their first birthday, when compared to mothers who were younger than 17 years. Very low birth weight infants born to teens younger than 17 had a lower mortality rate when compared to the state. High infant mortality rate and very low birth weight babies as seen in this age group and in the white population was often seen among African-Americans and teens of younger maternal age as demonstrated in some studies (Hertz-Picciotto & Din-Dzietham, 1998; Din-Dzietham & Hertz, 1997; DuPlessis, Bell & Richards, 1997) where African-American infants showed higher mortality rates in younger maternal age with low birth weight babies. In this study there was no difference in infant mortality between younger and older African-American teens. In looking at mortality of infants other than white, Hispanic or African-American teens, although the numbers were small, there was a trend toward higher infant mortality in the infants of younger teens. This finding paralleled the tendency in the State of California as a whole for all teens, but differed from the trend in San Bernardino County.

San Bernardino County presented somewhat of a unique situation in that teen mothers 17-19 years of age during the period of 1989-1993 had higher infant mortality rates than teen mothers who were under 17 years of age. While infant mortality was higher in children born to older teens, the difference was not statistically significant from the rate in younger teens. There was a 13% chance that this difference may be explained by chance alone rather than real differences between the two groups. Nevertheless, if the older group had the same IMR as the younger, only 176 infants of older teens would have died in the same time period, approximately 10 deaths per year. This finding of higher infant mortality rate among older teens does not correlate findings from studies by Rees, Lederman & Kiely (1996) where infant mortality decreased as maternal age increased. The infants of older white teens in San Bernardino County were more likely to die than the infants of younger white teens. The much larger numbers in this cohort completely overwhelm the opposite trend in the Other

cohort and accounted for the trend in teens as a whole.

Although maternal and paternal education variables were examined in this survey, they were not found to be associated with infant mortality in this population. This finding did not corroborate research findings by Sandiford et al. (1997). They found a correlation between the education of the mother and the health and mortality of the child, and this was unrelated to income level. According to their study, the mother's education or intelligence may have an important effect on child health and birth weight.

As would be expected, home deliveries were extremely dangerous with high rates of infant mortality. These differences were significant ( $p < 0.001$ ) in spite of the low number of deaths in the home delivery category. Of equal interest is the fact that births at government hospitals were more likely to result in death than births at private hospitals. This latter finding raised the question whether systematic differences in the patient population or systematic differences in care account for these dissimilarities. The fact that mortality rates vary considerably in the different types of facilities did not explain why infants of older teens were more likely to die than infants of younger teens.

The older teens were more likely to enter prenatal care during the first trimester while younger teens were more likely to receive care later in the second and third trimesters. This finding would suggest lower infant mortality in the older age group (17-19 years), which was not so in this population. Older teens entering prenatal care earlier than younger teens had poorer outcomes. While the difference is not statistically significant, the infants of teens in the older age group were approximately twice as likely to die as those of the younger teens when neither got prenatal care.

This study was not without its limitations. All the data used were abstracted from data files in the county and there is no way of knowing how accurate or reliable they were. It was not possible to include a component where these

mothers could be contacted and interviewed since the data used was over a five-year period.

When evaluating the data for San Bernardino County, some of the numbers were relatively small, and maybe less reliable. Infant mortality rates were calculated for all groups with 10 or more infant deaths. While rates may be representative they could not be considered reliable for less than 10 deaths.

We recommend a critical review of current programs within the county to ascertain and address the needs of teen pregnancy education, prenatal care, and prevention of very low birth-weight babies. There is need for further study to assess the level of social support and other risk factors that may adversely affect birth weight in teens especially those in the 17-19 years age group.

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