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DELAWARE VITAL  
STATISTICS SUMMARY  
REPORT ■ 2004



*DELAWARE HEALTH AND SOCIAL SERVICES*

Division of Public Health

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This report was prepared by  
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The cover photo was provided by  
Dr. Paul Silverman.

## 2004 SELECTED CHARACTERISTICS

Population			Number*	Percent	First Trimester Care		Number*	Percent
Delaware			830,566	100.0%	White		6,802	86.1%
Kent			138,754	16.7%	Black		2,321	80.9%
New Castle			519,555	62.6%	Hispanic		1,055	69.5%
Sussex			172,257	20.7%	Delaware		9,615	84.7%
					Kent		1,556	77.4%
					New Castle		6,485	91.1%
					Sussex		1,574	70.6%
Marriages			Number*	5-yr Rate <sup>1</sup>	Reported Pregnancies		Number*	5-yr Rate <sup>5</sup>
Delaware			5,088	6.4	Delaware		14,671	83.1
Kent			998	7.3	Kent		2,496	83.4
New Castle			2,801	5.8	New Castle		9,500	82.8
Sussex			1,289	7.5	Sussex		2,675	83.9
Divorces			Number*	5-yr Rate <sup>1</sup>	Pregnancy Outcomes		Number*	Percent
Delaware			3,108	3.8	Live Births		11,358	77.4%
Kent			701	5.2	Fetal Deaths		50	0.3%
New Castle			1,744	3.3	Induced Terminations (ITOP)		3,263	22.2%
Sussex			663	4.1				
Live Births			Number*	5-yr Rate <sup>2</sup>	ITOP by Place of Residence			
Delaware			11,358	63.8	Delaware		3,263	71.1%
Kent			2,010	66.6	Kent		481	14.7%
New Castle			7,120	61.5	New Castle		2,342	71.8%
Sussex			2,228	69.8	Sussex		440	13.5%
Other States							1,325	28.9%
Births to Teenagers (15-19)					Infant Mortality		Number*	5-yr Rate <sup>6</sup>
White			645	35.4	Delaware		97	9.3
Black			505	75.6	White		51	7.3
Delaware			1,179	45.1	Black		44	16.1
Kent			234	47.9	Hispanic		8	7.9
New Castle			660	40.7				
Sussex			285	57.7	Mortality		Number*	Adj. Rate <sup>7</sup>
Race			Number*	Percent	Delaware		7,124	795.2
White			7,897	69.5%	Kent		1,154	744.8
Black			2,870	25.3%	New Castle		4,146	818.5
Hispanic Origin <sup>4</sup>			1,519	13.4%	Sussex		1,824	789.0
Marital Status					Race and Gender			
Married			6,557	57.7%	White Males		2,957	944.1
Single			4,801	42.3%	White Females		2,905	642.6
Births to Single Mothers <sup>3</sup>					Black Males		622	1232.0
White			2,640	33.4%	Black Females		582	853.6
Black			2,036	70.9%	Leading Causes of Death		Number*	Percent
Hispanic			883	58.1%	Heart Disease		2,011	28.2%
Low Birth Weight (<2500 gms)					Cancer		1,822	25.6%
All Races			1,024	9.0%	Stroke		348	4.9%
White			573	7.3%	Chronic Lower Respiratory Disease		345	4.8%
Black			395	13.8%	Unintentional Injuries		290	4.1%
Hispanic			96	6.3%				

### Notes:

\* Numbers are for 2004.

1. The 5-year rate is per 1,000 population and refers to the period 2000-2004.

2. The 5-year rate refers to total live births per 1,000 women 15-44 years of age during the 2000-2004 period.

3. Percentages for births to single mothers are based on total births for the race-group.

4. People of Hispanic origin may be of any race. The percentage is based on total resident births for 2004.

5. The 5-year pregnancy rate represents the number of reported pregnancies per 1,000 women 15-44 years of age for 2000-2004.

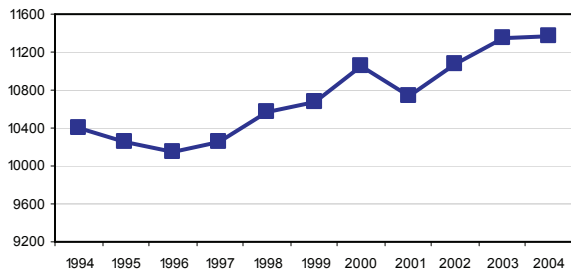
6. The 5-year (2000-2004) infant mortality rates represent the number of deaths to children under one year of age per 1,000 live births.

7. The 2004 mortality rates (deaths per 100,000 population) for Delaware and counties are age-adjusted to the 2000 U.S. population.

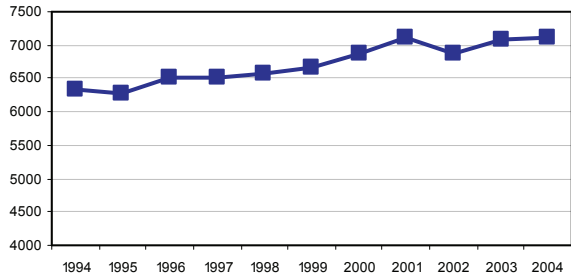
Source: Delaware Health Statistics Center

# VITAL STATISTICS TRENDS

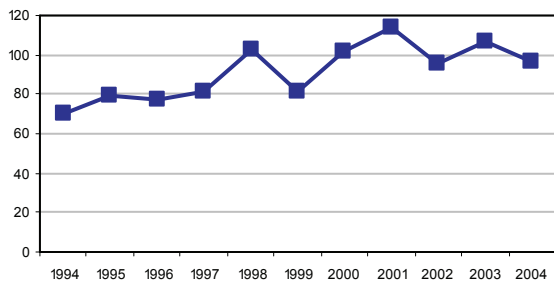
**Live Births**  
Delaware, 1994-2004



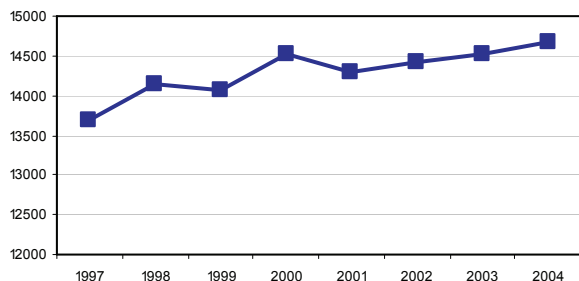
**Deaths**  
Delaware, 1994-2004



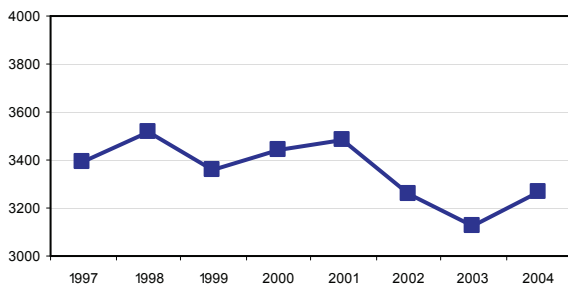
**Infant (< 1 year of age) Deaths**  
Delaware, 1994-2004



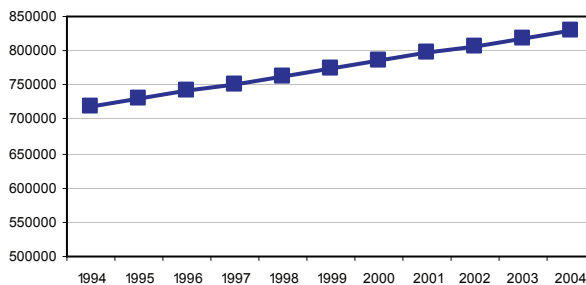
**Reported Pregnancies**  
Delaware, 1997-2004



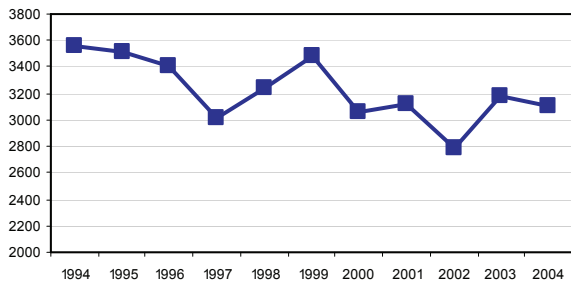
**Abortions**  
Delaware, 1997-2004



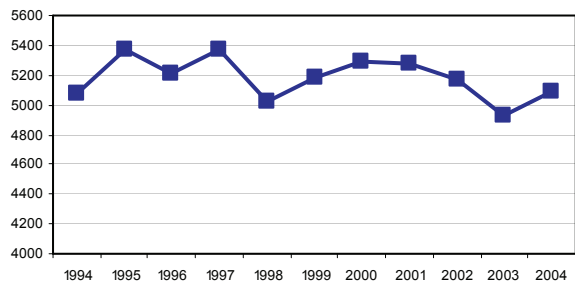
**Population**  
Delaware, 1994-2004



**Divorces**  
Delaware, 1994-2004



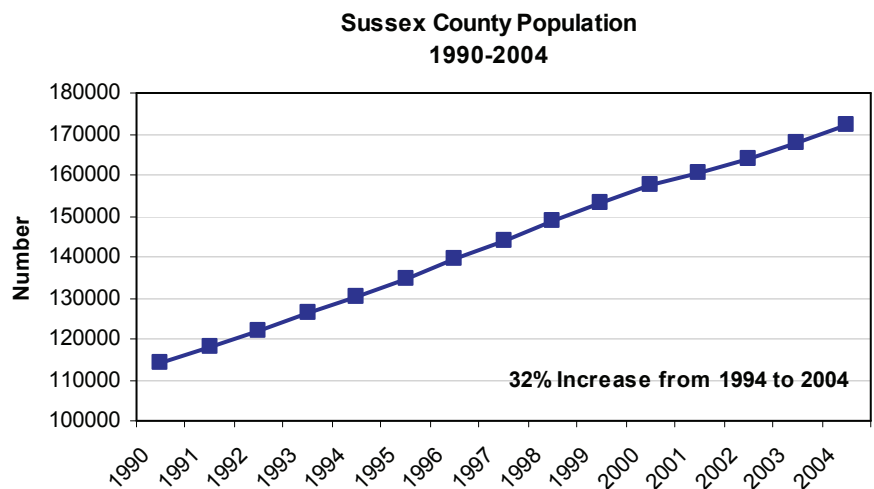
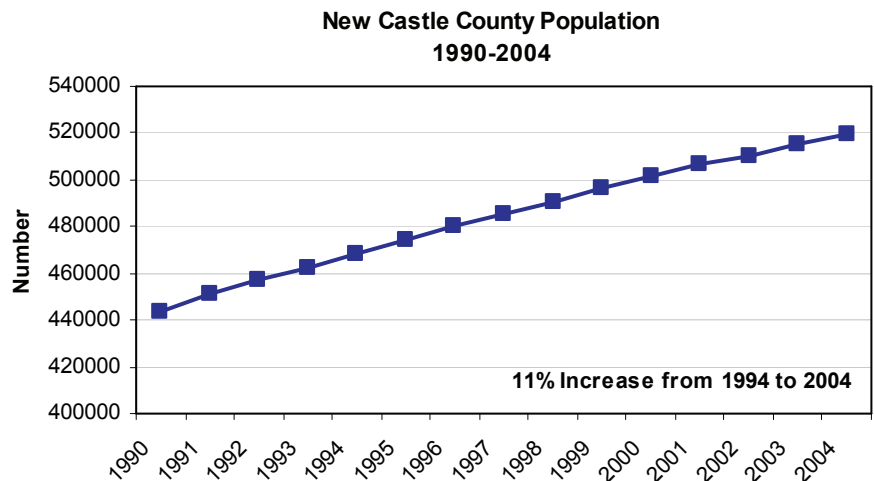
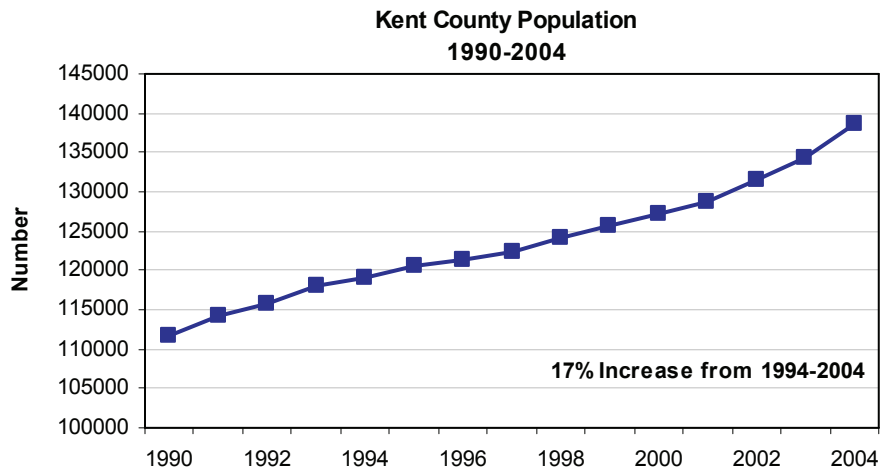
**Marriages**  
Delaware, 1994-2004



## POPULATION

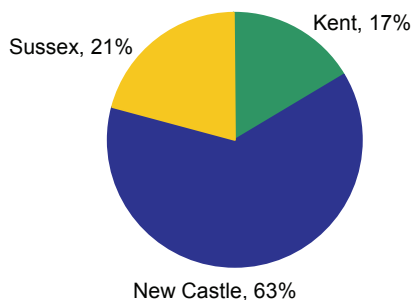
Each of Delaware's three counties continued their increasing population trend, though they grew at different rates. For the recent period from 2000 to 2004, county populations grew annually by 2.3 percent for Kent, 0.9 percent for New Castle, and 2.4 percent for Sussex. The overall increase for Delaware was 1.4 percent.

### Delaware Resident Population by County, 1990-2004



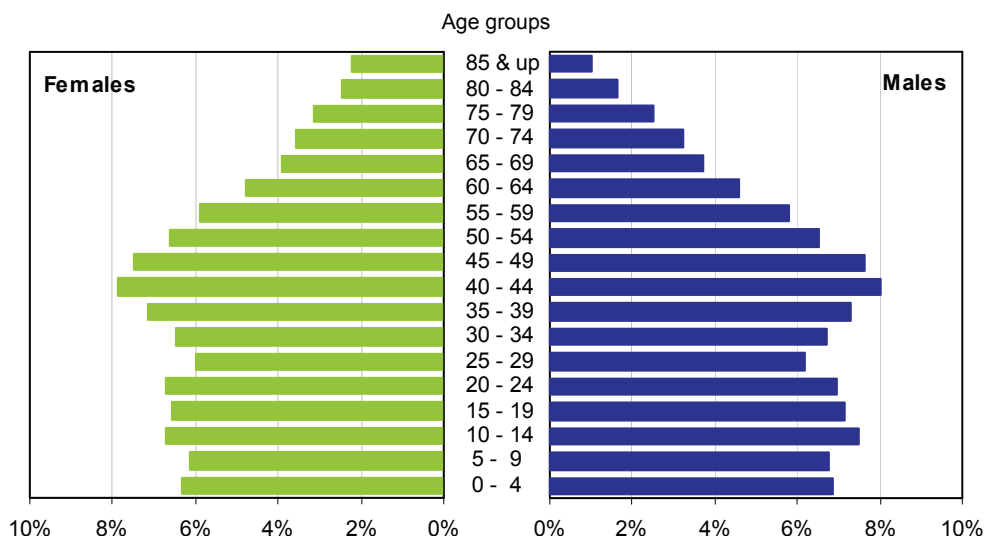
Over half of Delaware's population resides in New Castle County.

**Percent of Population by County Delaware, 2004**

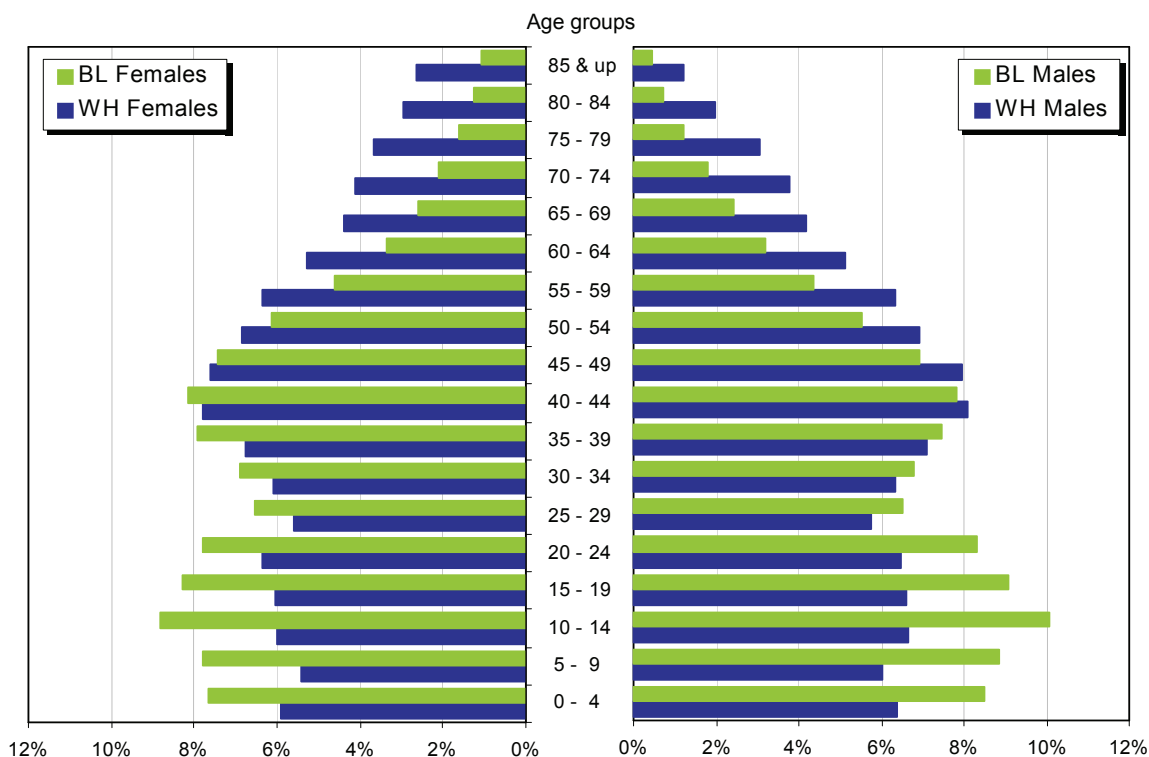


## POPULATION

Just over 50 percent of Delaware's population was female in 2004. Females made up a greater proportion of the older age groups, which reflects the longer female life expectancy. Delaware females born in 2004 could expect to live an average of 80.5 years, versus males, who could expect to live 74.9 years.



When the population was broken down by race, the higher proportion of females in the older age groups appeared in the black population as well. However, both black males and females had a greater percentage of their population in the 0-39 year age range than whites; in the 40 and above age range, whites made up a greater proportion of the population.



## MARRIAGE AND DIVORCE

### Marriage

#### Male

Youngest: 16  
Oldest: 93

#### Female

Youngest: 14  
Oldest: 81

Marriage with the greatest age difference between bride and groom: 49 years

### Divorce

#### Male

Youngest: 19  
Oldest: 87

#### Female

Youngest: 15  
Oldest: 80

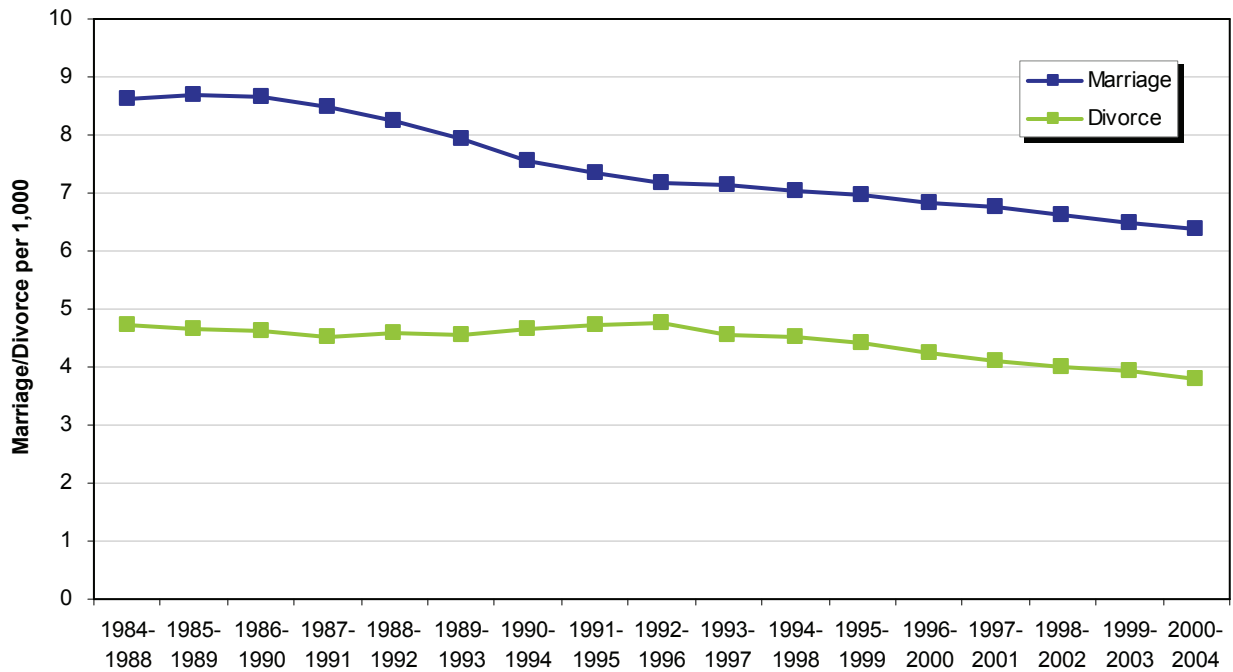
Marriage of shortest duration: 77 days

Marriage of longest duration: 50.3 years

The five-year average marriage rate changed very little from 1984-1988 to 1986-1990. Since that time, marriage rates have decreased 26 percent, from 8.7 to 6.4 marriages per 1,000 population in 2000-2004.

Divorce rates remained fairly stable from 1984-1988 to 1992-1996, ranging from 4.5 to 4.7. From 1992-1996 to 2000-2004, divorce rates declined 19 percent to 3.8 divorces per 1,000 population.

**Five-year Average Marriage and Divorce Rates per 1,000 Population  
Delaware, 1984-2004**

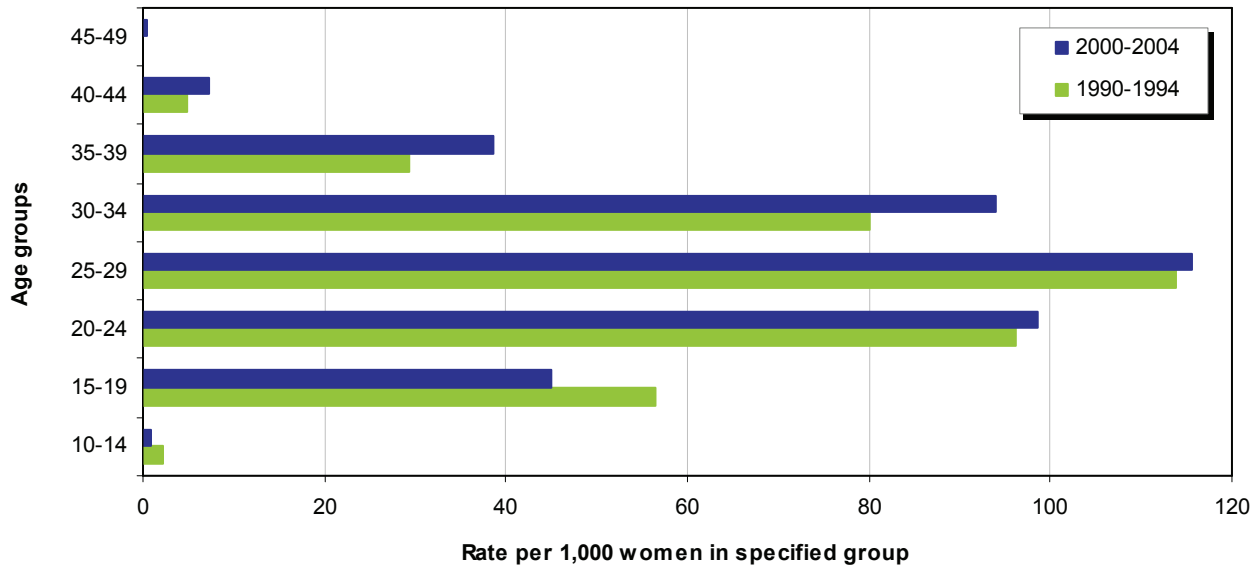


## LIVE BIRTHS

In 2004, there were 12,080 births in Delaware, 10,836 were to Delaware residents and 1,244 were to non-residents. Additionally, 522 births to Delaware residents occurred out of state, for a total of 11,358 Delaware resident births, 21 more than 2003.

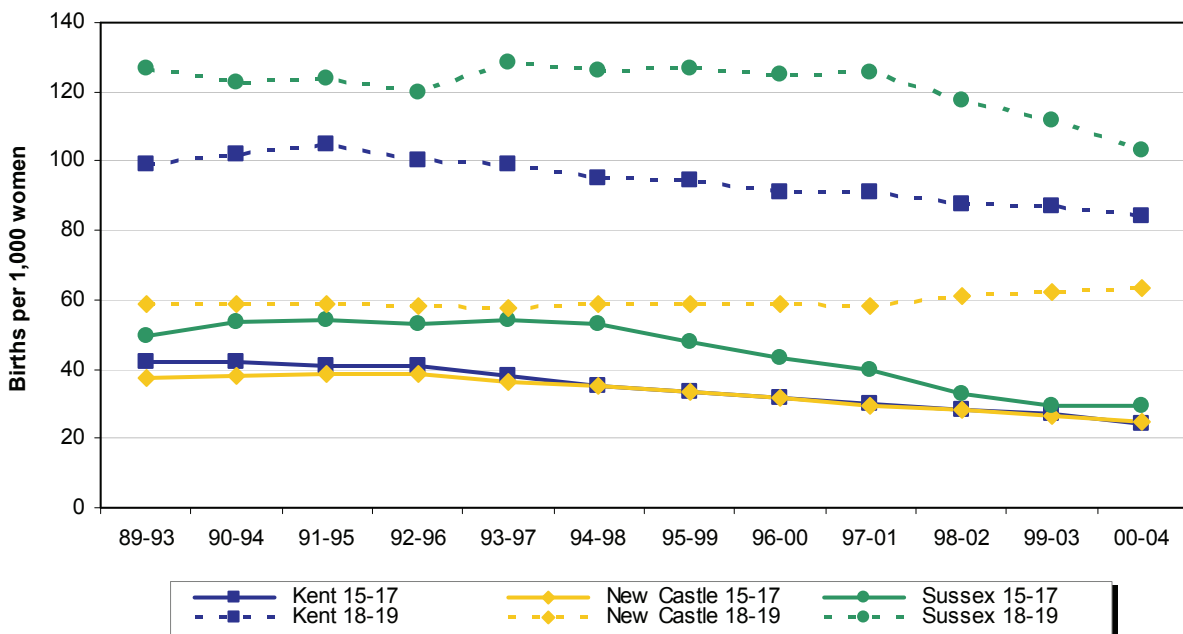
Delaware's general fertility rate was 63.8 live births per 1,000 females aged 15-44 years in 2000-2004. However, when broken down into specific age groups, birth rates and trends vary substantially and display a shift toward older mothers in the distribution of birth rates.

**Five-year Average Live Birth Rates by Age of Mother  
Delaware, 1990-1994 and 2000-2004**



The teen (15-19) birth rate varied by county and specific teen age groups. Although Sussex County's teen birth rates for younger teenagers were unchanged from 1999-2003 to 2000-2004, and those for older teenagers declined, its rates were the highest of the three counties, with 103 births per 1,000 females aged 18-19, and 29.0 births per 1000 females aged 15-17.

**Five-year Teen Live Birth Rates by County and Age Group  
Delaware, 1989-2004**

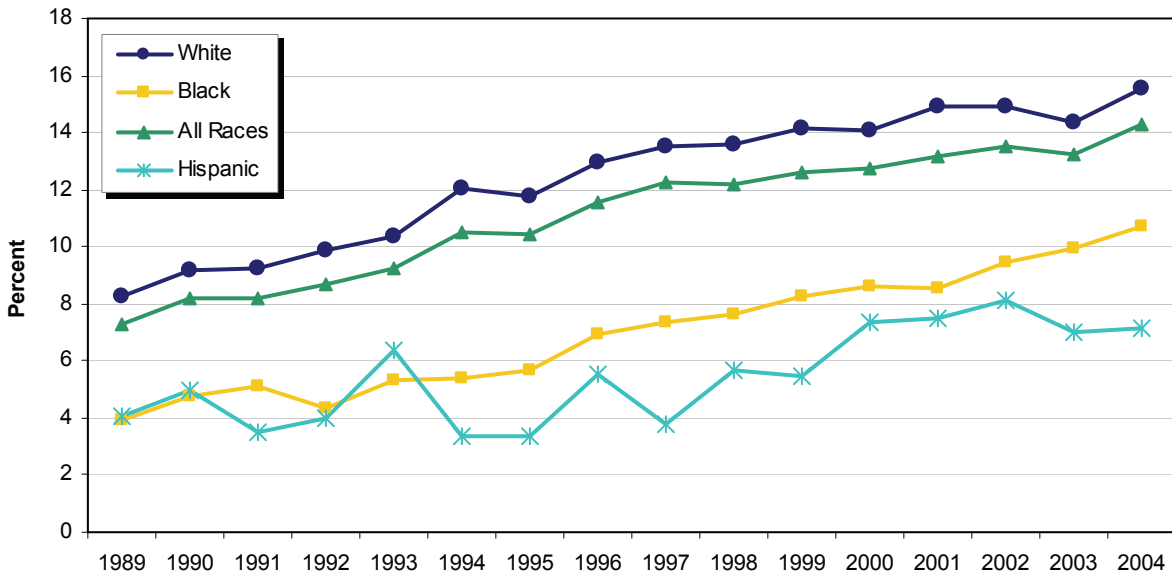




## LIVE BIRTHS

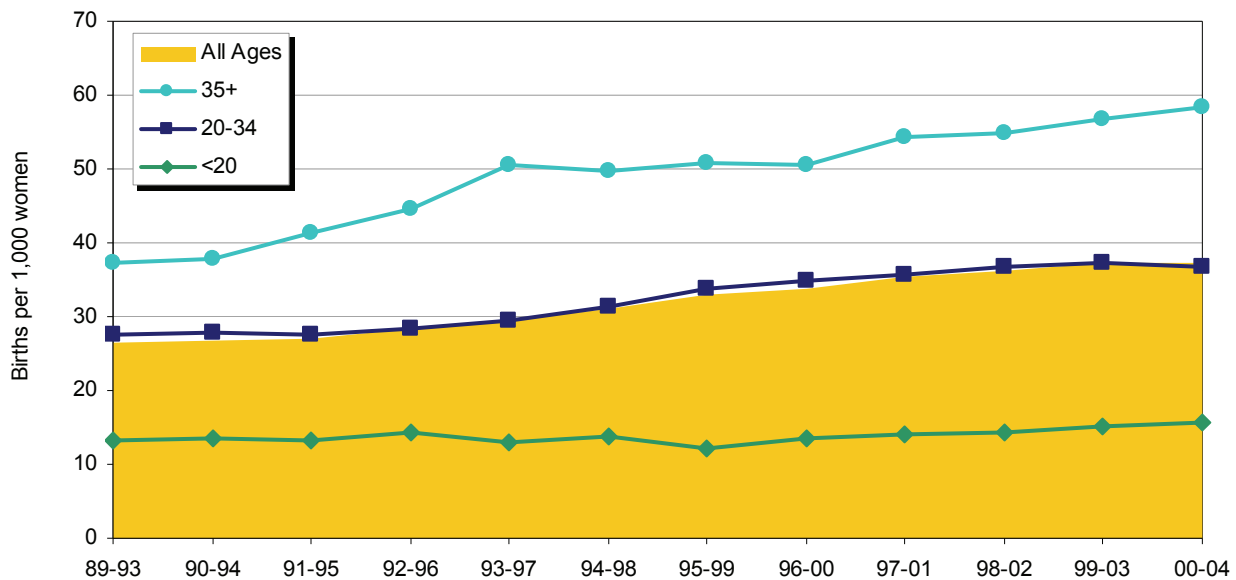
The overall trend for births to women of all races and ethnicities, aged 35 and older, has been steadily increasing. This same trend was even more pronounced when looking at the percent of live births to first-time mothers 35 and older.

**Annual Percent of Live Births to Women 35 or Older by Race and Hispanic Origin  
Delaware, 1989-2004**



The age of the mother had a significant impact on the plural birth rate. Older mothers (35+) had the highest plural birth rate, which increased by 57 percent from 1989-1993 to 2000-2004, while the plural birth rate for younger women (<20) remained stable.

**Five-year Average Plural Birth Rate by Age of Mother  
Delaware, 1989-2004**

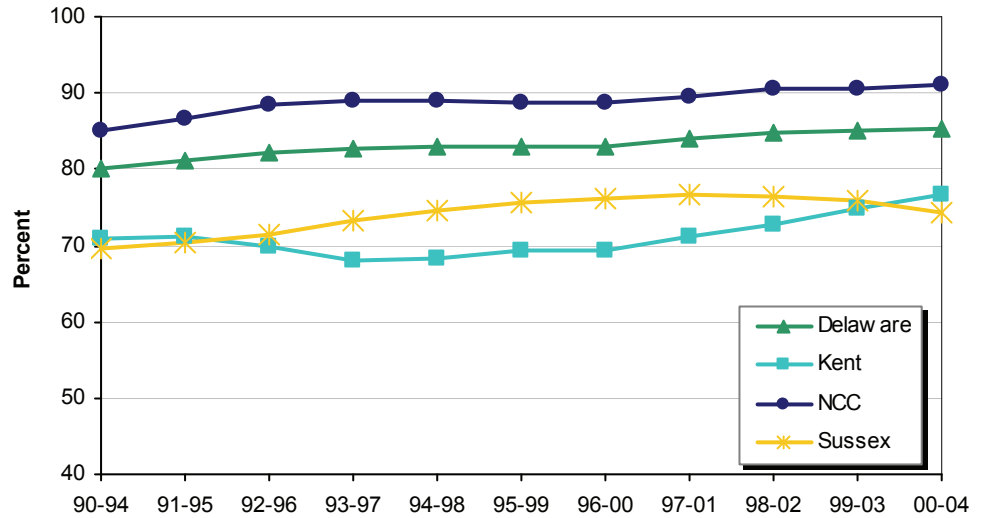


## LIVE BIRTHS

Delaware has consistently increased the percentage of women receiving prenatal care (PNC) in the first trimester, from 80 percent in 1990-1994 to 85.4 percent in 2000-2004.

Over the same time period, Wilmington, normally an area where maternal risk factors are the worst, showed a 19 percent increase in the number of women receiving prenatal care in the first trimester, from 71.0 percent in 90-94 to 84.8 percent in 00-04. Wilmington's increase was apparent in births to both black and white mothers.

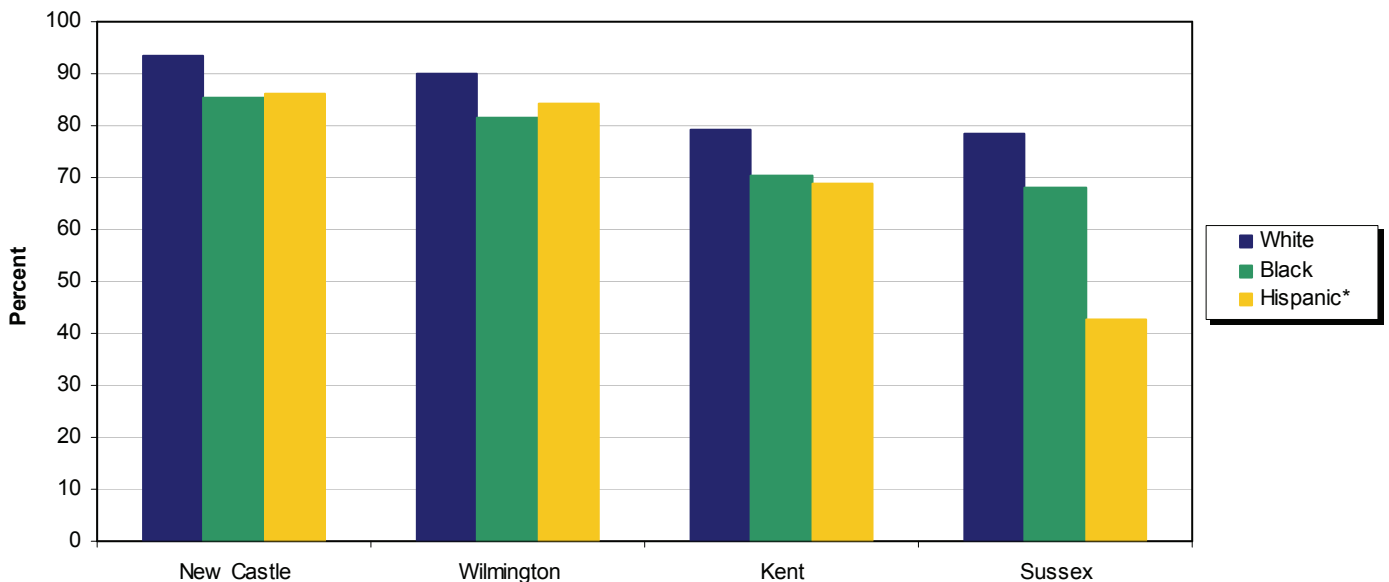
Five-Year Average Percentage of Births to Mothers Beginning Prenatal Care in the First Trimester Delaware and Counties, 1990-2004



As both Kent and New Castle counties extended their increasing trend of women receiving prenatal care in the first trimester, Sussex county continued its more recent decreasing trend, and became the county with the lowest percent of births to women who received prenatal care in the first trimester.

The graph below illustrates how the percentages of prenatal care differ among racial and ethnic groups, and the counties as well. New Castle county had the highest rates of women receiving prenatal care in the first trimester, regardless of race; isolating Wilmington produced similar results. Another observation unique to Wilmington and New Castle County was that mothers of Hispanic origin received higher percentages of prenatal care in the first trimester than black mothers. Sussex County had the lowest percentage of black and Hispanic mothers receiving prenatal care in the first trimester, at 68.0 and 43 percent.

Five-Year Average Percentage of Mothers Receiving PNC in First Trimester by County and Race, Delaware 2000-2004



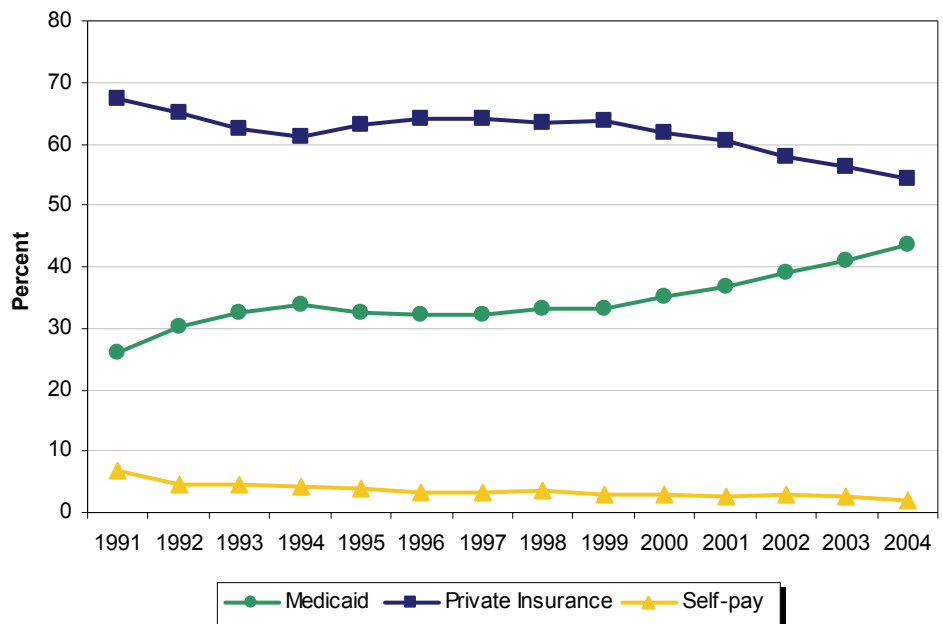
\*Hispanic may be of any race.

## LIVE BIRTHS

The increasing trend of women using Medicaid as their primary source of payment continued in 2004.

- For the majority of mothers under 20 years of age, Medicaid was the primary source of payment, ranging from 76.4 percent for white mothers to 93.1 percent for mothers of other races.
- Over half of Hispanic and black mothers of all ages used Medicaid as the primary source of payment for delivery.

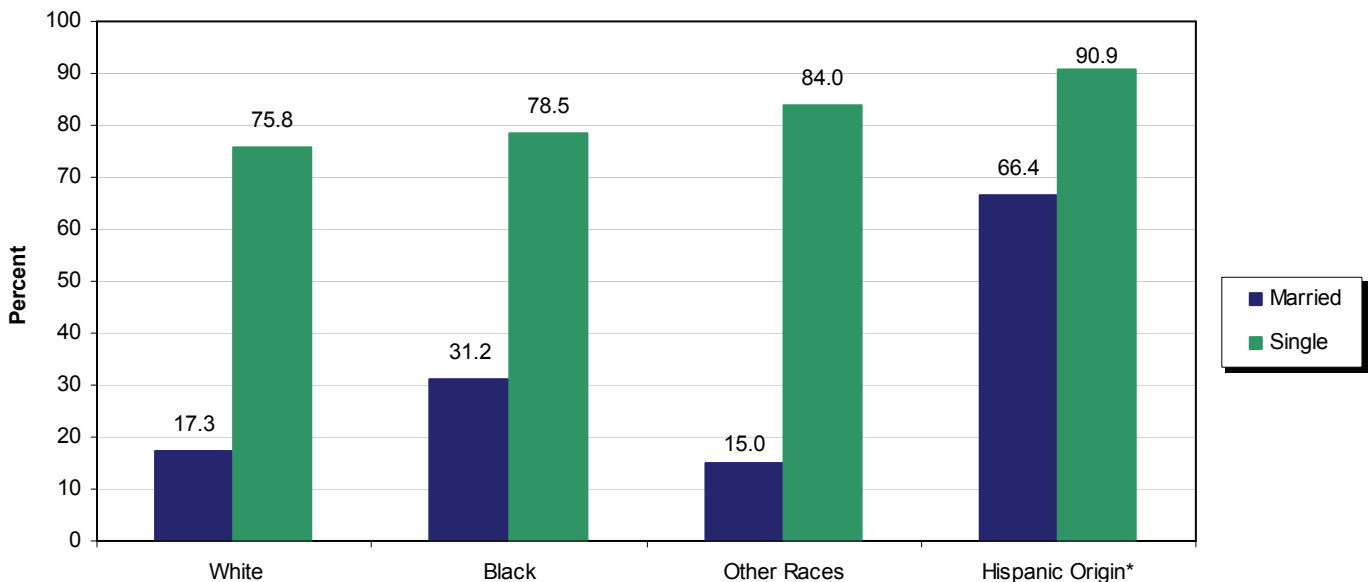
**Percent of Births by Source of Payment for Delivery  
Delaware, 1991-2004**



Marital status has a tremendous effect on the use of Medicaid as a primary source of payment for delivery:

- 17.3 percent of white married women used Medicaid as their primary source of payment, but that number more than quadrupled, to 75.8 percent if the mother was single.
- 31.2 percent of black married women used Medicaid as their primary source of payment, but that number more than doubled, to 78.5 percent if the mother was single.
- 66.4 percent of Hispanic married women used Medicaid as their primary source of payment, and that number increased to 90.9 percent if the mother was single.
- 15.0 percent of married women of other races used Medicaid as their primary source of payment, but that number increased over five times, to 84.0 percent if the mother was single.

**Percent of Births by Race, Hispanic Origin, Marital Status, and  
Medicaid as Primary Source of Payment  
Delaware, 2004**

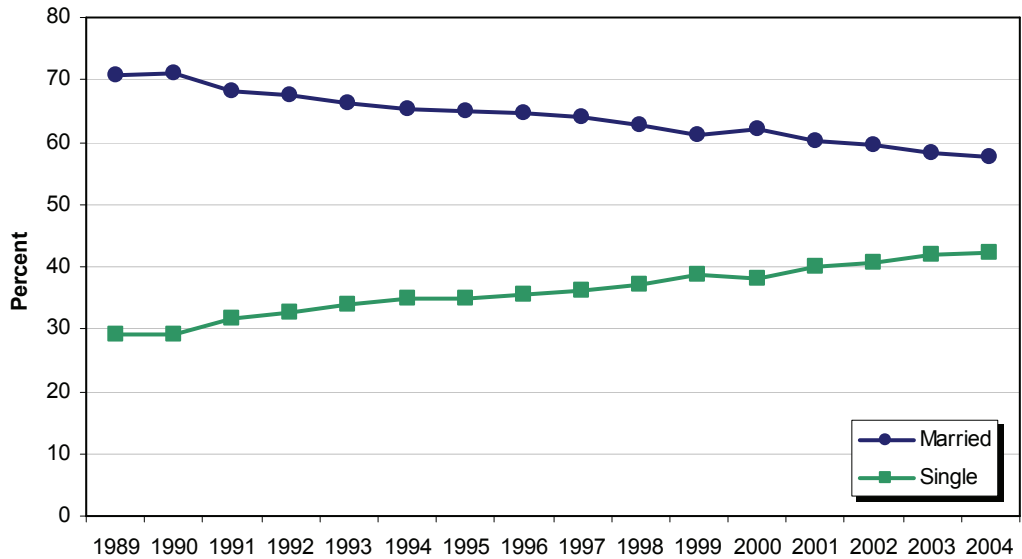


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## LIVE BIRTHS

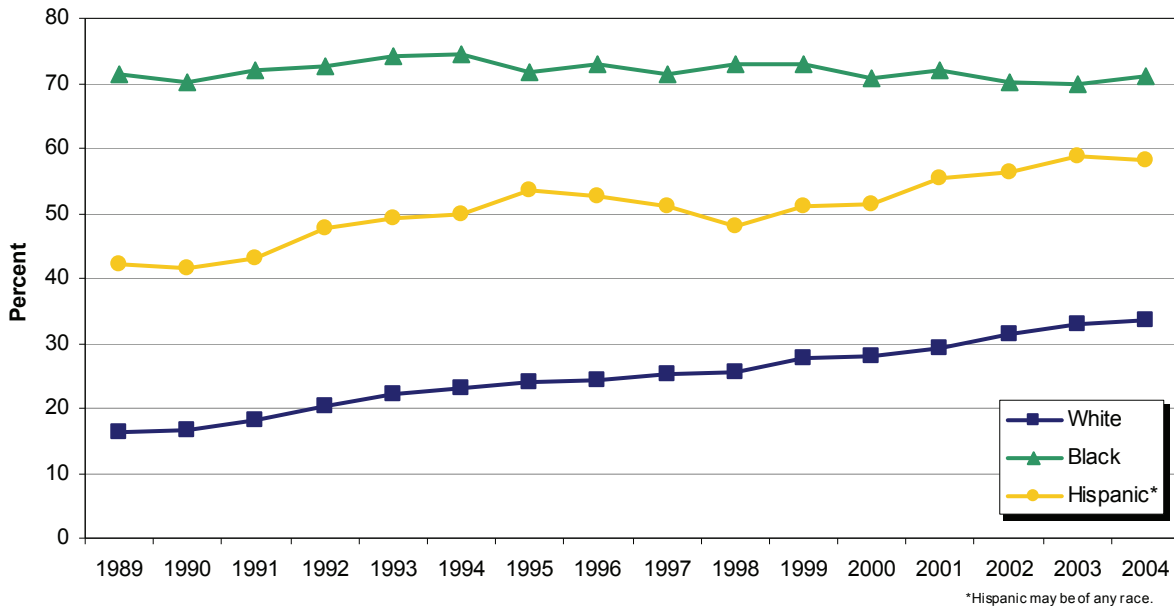
The percent of births to unmarried women rose again in 2004, to 42.3 percent of all births. The steadily increasing trend began in 1990, when 29 percent of all births were to unmarried women.

**Annual Percent of Births by Mother's Marital Status  
Delaware, 1989-2004**



However, this shift in the distribution of mother's marital status was only apparent in births to white and Hispanic women, whose percentage of births to unmarried women increased from 16 percent to 33 percent, and 42 percent to 58 percent from 1989 to 2004. During this same time period, the percent of births to unmarried black women has remained stable, at about 71 percent of all black births.

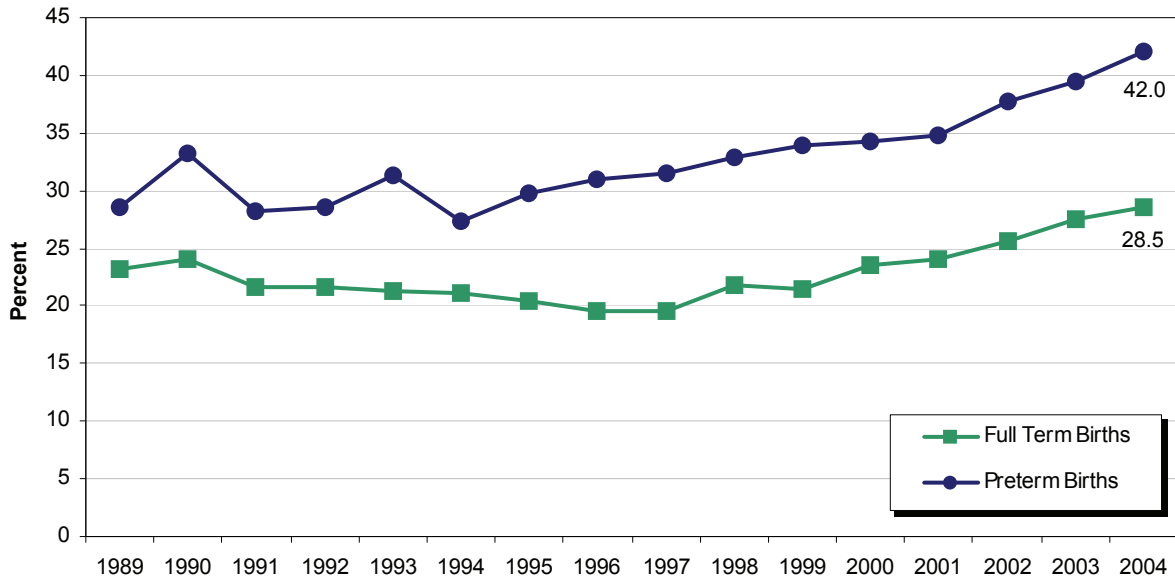
**Percent of Live Births to Unmarried Women by Race and Ethnicity  
Delaware, 1989-2004**



## LIVE BIRTHS

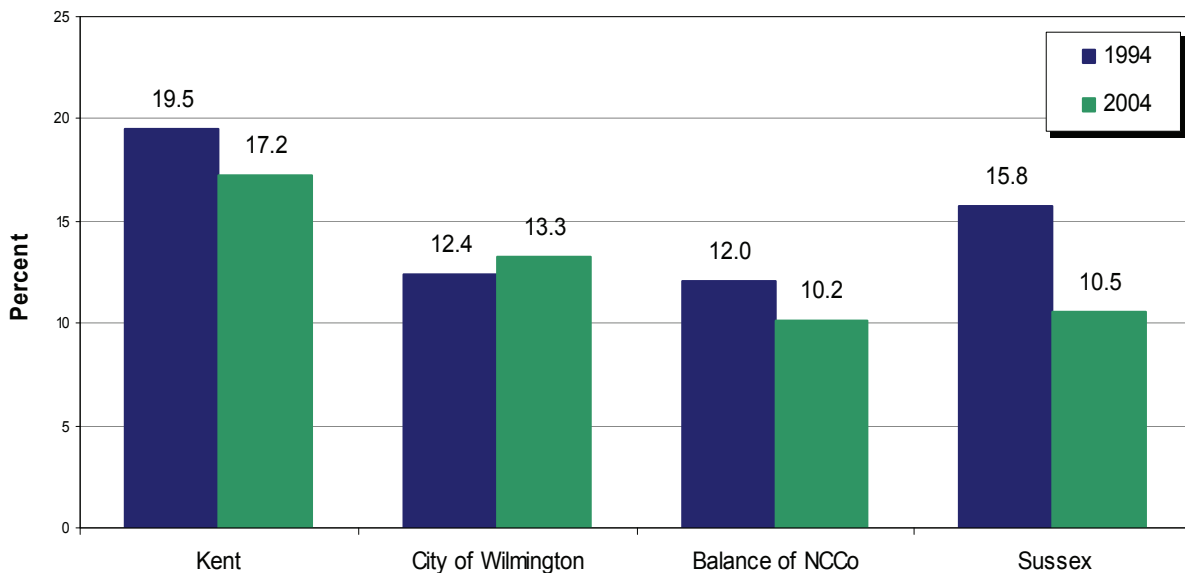
The percentage of cesarean deliveries continued its upward trend by increasing from 29.1 in 2003 to 30.3 in 2004. While this was evident in deliveries of both preterm (<37 weeks gestation) and full term (37+ weeks gestation) infants, a significantly higher percentage of preterm infants were delivered by c-section than full term infants.

**Annual Percent of Cesarean Deliveries by Gestational Category  
Delaware, 1989-2004**



The percentage of Delaware mothers who used tobacco while pregnant decreased from 1994 to 2004 in the three counties, while it increased in the city of Wilmington. In 2004, Kent County had the highest percentage of mothers who smoked while pregnant (17.2).

**Percent of Mothers who Smoked while Pregnant  
Delaware Counties and City of Wilmington, 1994 and 2004**

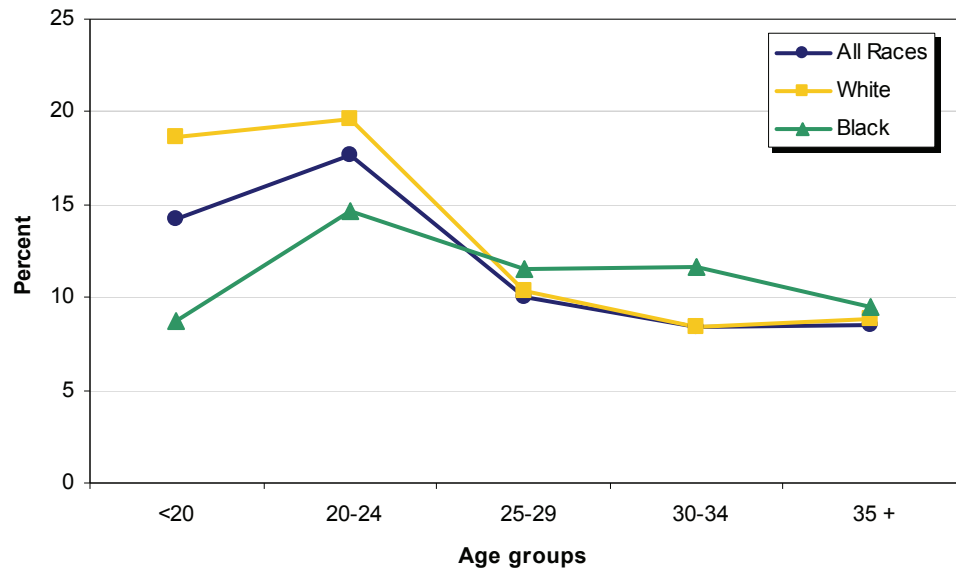


## LIVE BIRTHS

The majority of mothers who smoked while pregnant were in the 20-24 age group, regardless of race. With the exception of black mothers, those in the 25 and older age groups had lower proportions of smokers than those in the under 20 or 20-24 age groups.

For age groups under 25, white mothers were more likely to smoke while pregnant than black mothers. Conversely, for age groups 25 years and older, black mothers were more likely to smoke while pregnant.

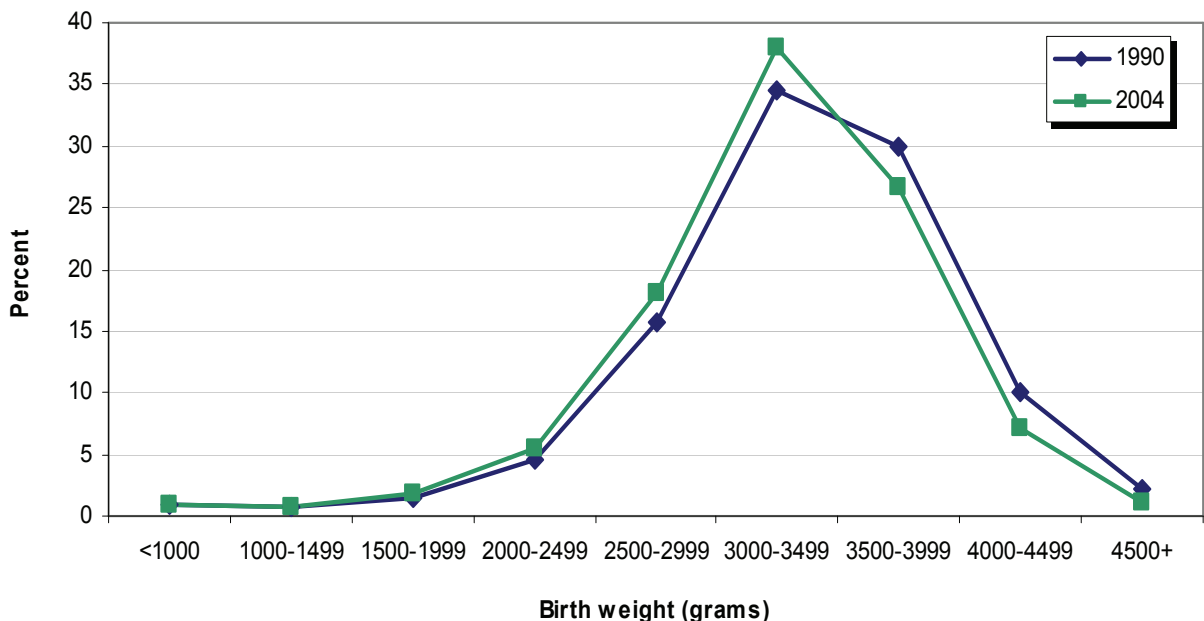
**Percent of Mothers who Smoked While Pregnant by Age Group and Race Delaware, 2004**



13 percent of Delaware women who smoked while pregnant gave birth to low birthweight babies (< 2500 grams), versus the significantly lower percentage (8.4) of non-smokers who gave birth to low birthweight babies.

The percent distribution of births by birthweight did not differ significantly between 1990 and 2004. The highest percentage of births had birthweights ranging from 3000 to 3499 grams.

**Percent Distribution of Births by Birth Weight Delaware, 1990 and 2004**



## LIVE BIRTHS

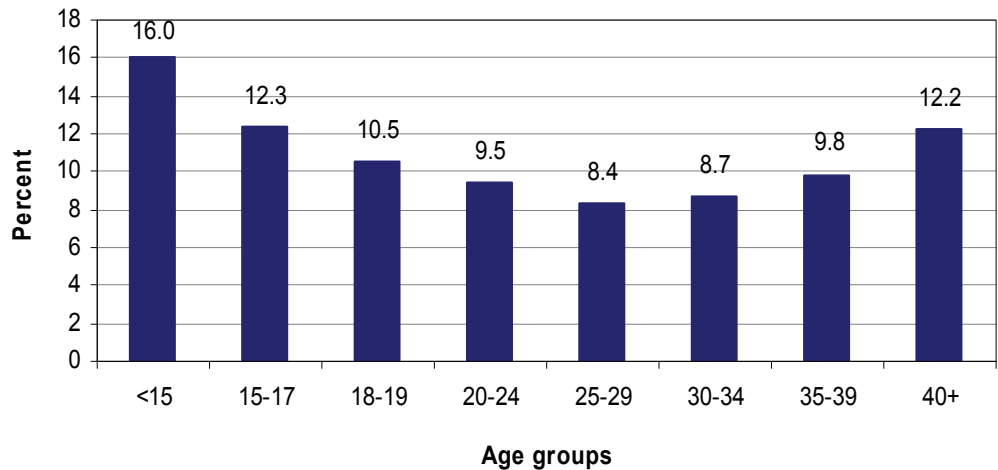
The five-year average percentage of low birthweight (LBW) births continued its upward trend during the last four time periods; very low birthweight (VLBW) births have remained relatively stable. Percentages of LBW births were greatest for mothers under 15 years (16 percent).

With the exception of mothers under 15, black mothers of every age group had higher percentages of LBW births than white or Hispanic mothers.

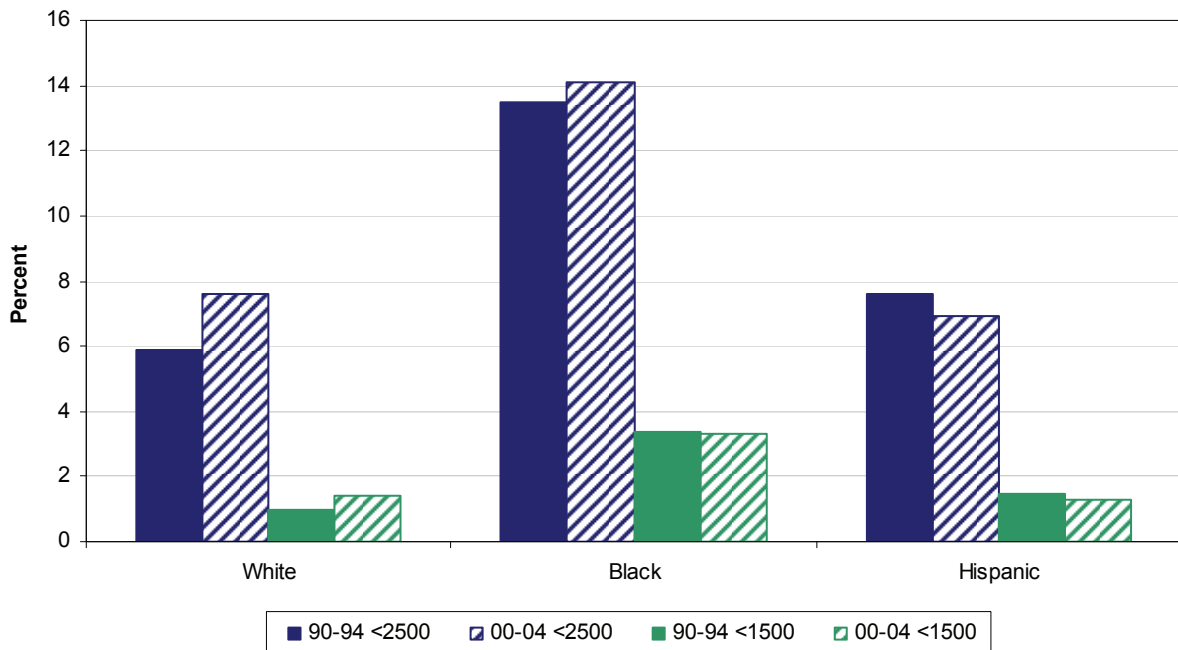
In the 40 plus group, black women have higher percentages of LBW births (14.2 percent versus 7.7 percent of white women), but in the under 15 group, white women have higher percentages of LBW births (19.6 percent versus 14.5 percent of black women).

Among mothers of all ages, black mothers had the highest percentage of LBW and VLBW births, at 14.1 percent and 3.3 percent respectively. There was an increase in the percentage of LBW births from 1990-1994 to 2000-2004 for both the black and white race. During the same time period, the percentage of LBW births to Hispanic women decreased.

Five-year Percent of Low Birthweight Births (<2500 Grams) by Mother's Age Delaware, 2000-2004



Five-year Average Percent of Low (<2500 grams) and Very Low (<1500 grams) Birthweight Births by Race and Hispanic Origin\* Delaware, 1990-1994 and 2000-2004

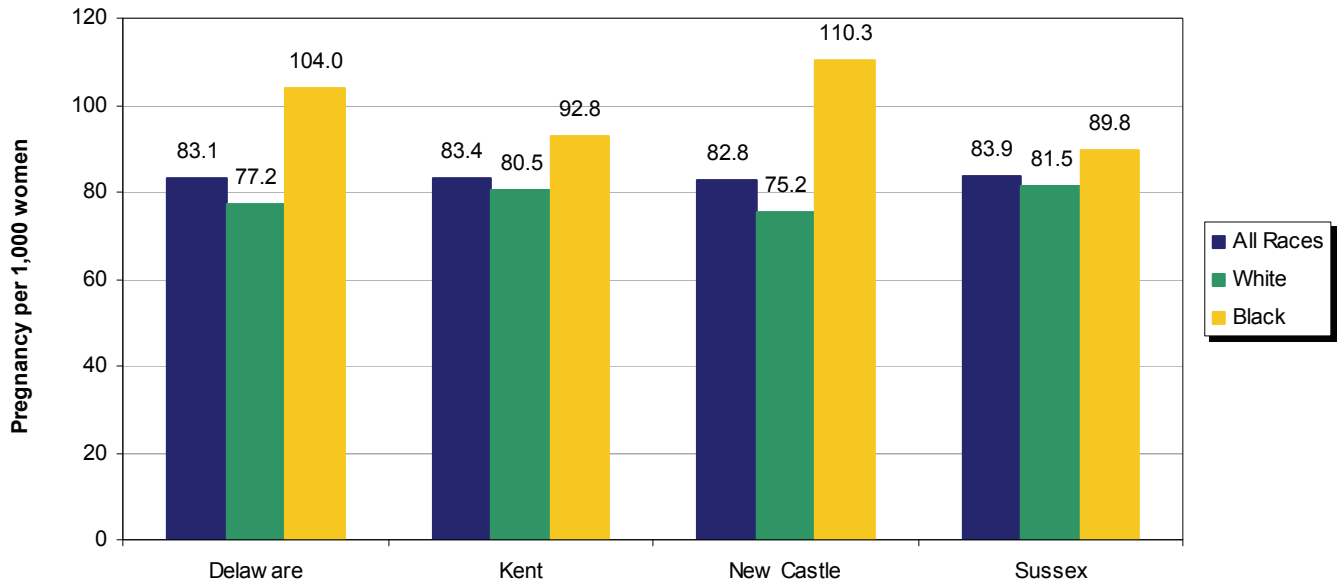


\*Hispanic may be of any race.

## REPORTED PREGNANCIES

At 83.1 reported pregnancies per 1,000 women ages 15–44, the 2000-2004 rate of reported pregnancies changed very little from 1999-2003. Although pregnancy rates of black mothers were significantly higher than those of white mothers in every county, New Castle County's difference between white (75.2) and black (110.3) was the largest among all the counties.

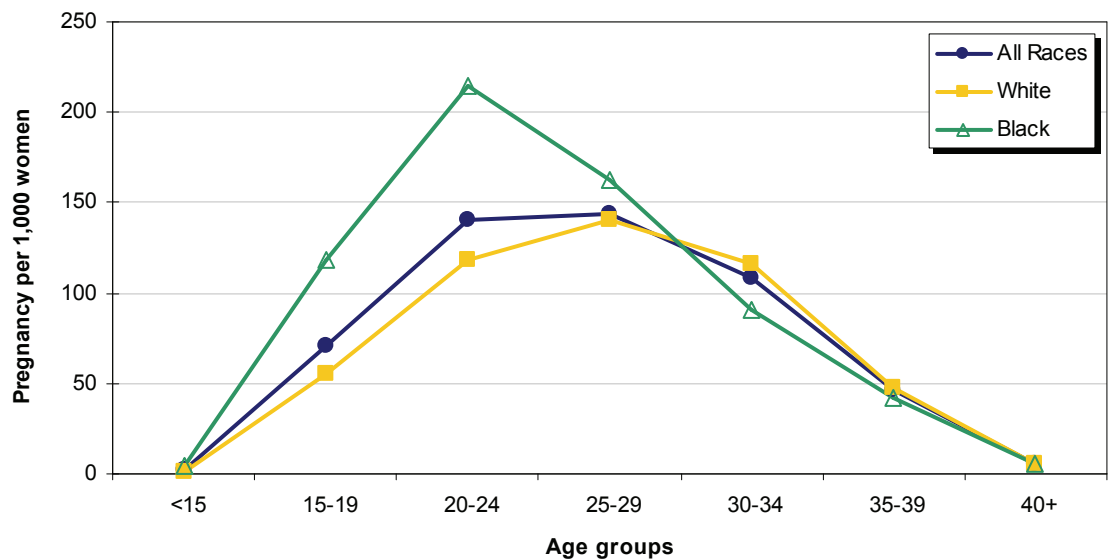
**Five-year Average Rate of Reported Pregnancies by Race  
Delaware and Counties, 2000-2004**



For all races, the 25-29 year age group had the highest pregnancy rate, with 144 pregnancies per 1,000 women in 2000-2004.

Black women under 30 had higher pregnancy rates than white women of the same age group; from age 30 and up, white women had higher pregnancy rates.

**Five-year Average Rate of Reported Pregnancies by Age and Race  
Delaware, 2000-2004**



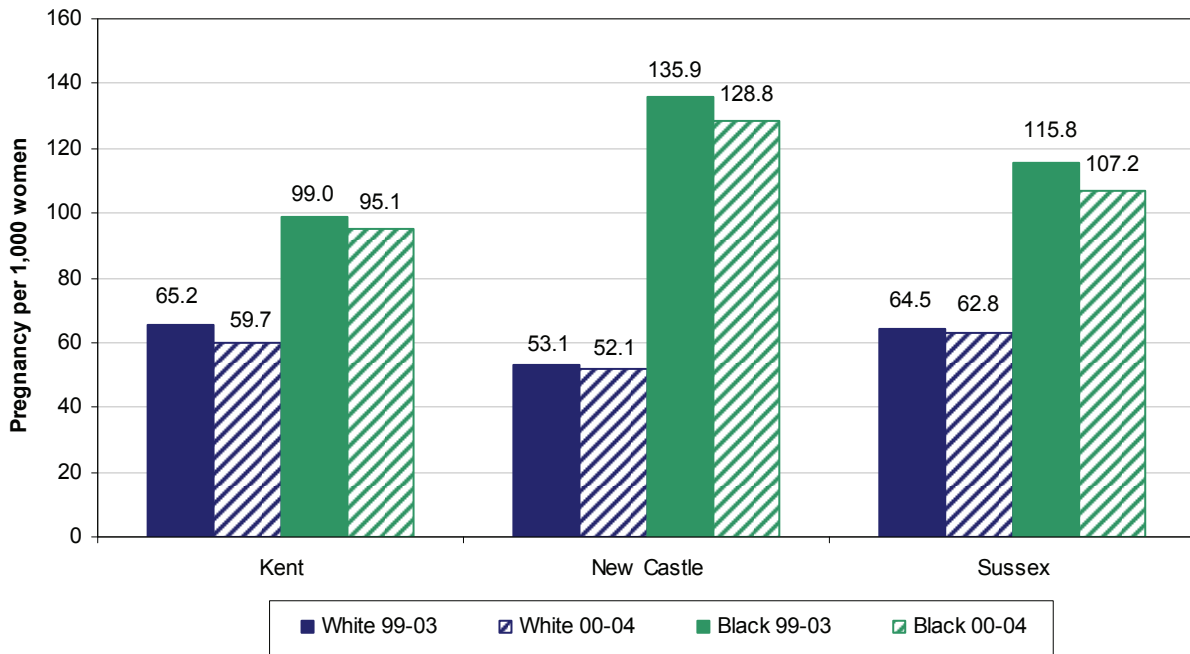


## REPORTED PREGNANCIES

From 1999-2003 to 2000-2004, teen (15-19) pregnancy rates for each race and county group declined, ranging from a decrease of 1.9 percent (for white teens in New Castle county) to 8.5 percent (for white teens in Kent county).

Even with the continued decreases, black teenage pregnancy rates continue to be 59 percent to 147 percent higher than white rates in the same county.

**Five-year Average Teenage (15-19) Pregnancy Rates by County and Race  
Delaware, 1999-2004**

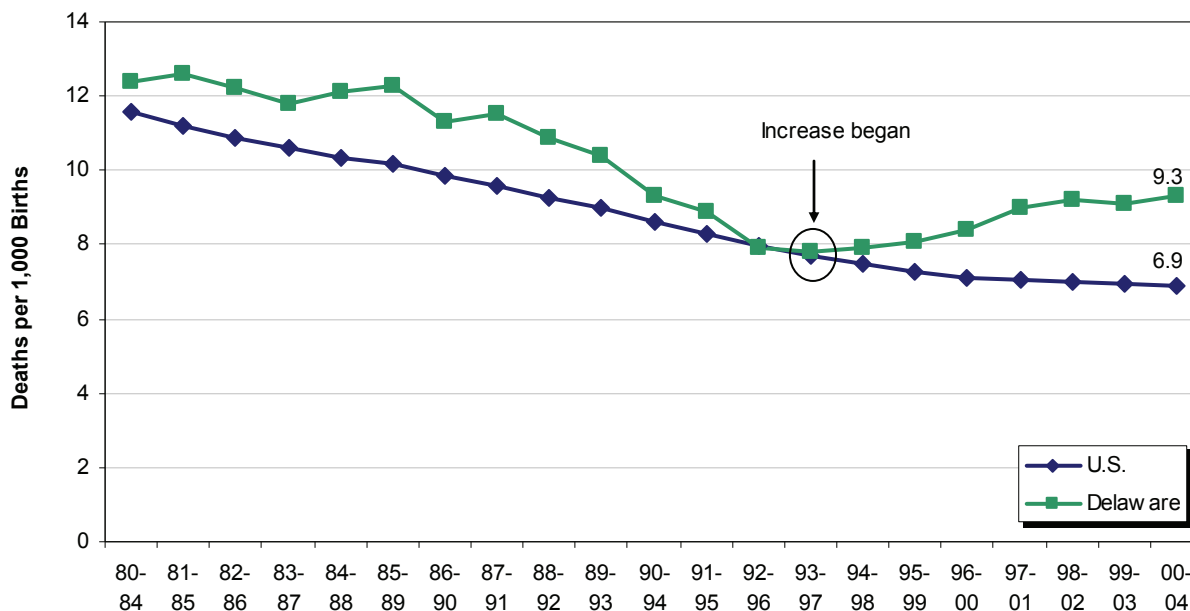


- In 2004, there were 4588 abortions performed in Delaware, 3263 to Delaware residents and 1325 to non-residents.
- Over half of all pregnancies to females under 15 ended in termination.
  - ⇒ 52.9 percent of pregnancies to white mothers under 15, and 50 percent of pregnancies to black mothers under 15 ended in terminations.
- Married women undergo significantly fewer terminations than their single counterparts.
  - ⇒ 5 percent of pregnancies to white married women ended in termination and 13 percent of pregnancies to black married women ended in termination.
  - ⇒ When the mothers were unmarried, these numbers increased to 36 and 37 percent respectively.
- There were 50 fetal deaths of Delaware residents in 2004.
- There were 11,358 live births to Delaware residents in 2004.

## INFANT MORTALITY

Although Delaware's infant mortality rate (IMR) was significantly higher than the national rate throughout most of the 1980s, Delaware followed the nation's downward trend to a point where the U.S. and Delaware rates were very similar. The 1994-1998 time period signaled a reversal of this trend and Delaware's rates have risen almost every five-year interval since then, with the most recent period, 2000-2004, showing a rate of 9.3 infant deaths per 1,000 births, significantly higher than the U.S. rate of 6.9 infant deaths per 1,000 births.

**Five-year Average Infant Mortality Rates  
Delaware and U.S., 1980-2004**

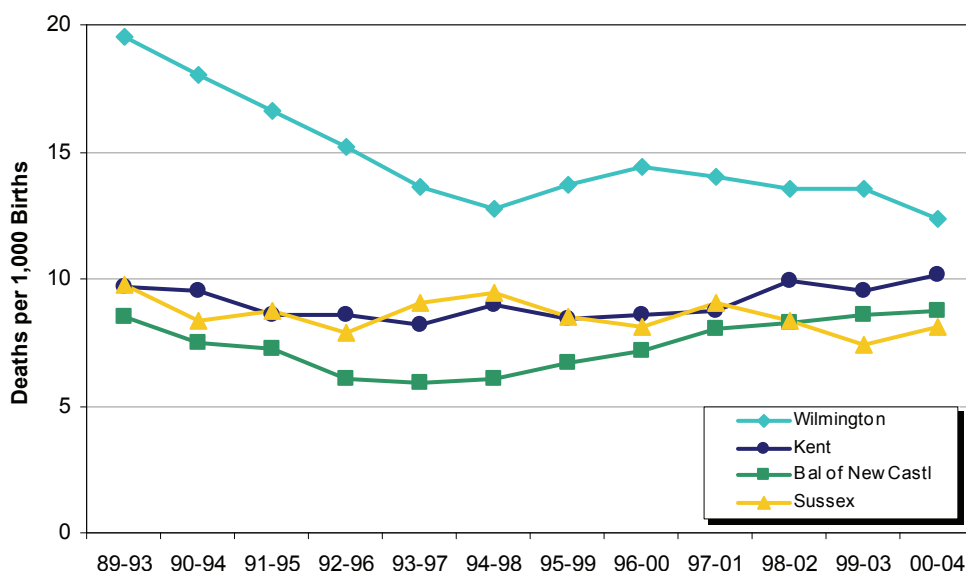


Though Sussex County's IMR increased 8 percent from 1999-2003 to 2000-2004, at 8.1 infant deaths per 1,000 births it still had the lowest rate of the three counties. Kent County's IMR increased as well, and at 10.2, not only was it at its highest rate since the 1988-1992 time period, but it was also the highest of the three counties.

Although New Castle County's rate changed very little from 1999-2003 to 2000-2004, isolating Wilmington from the balance of New Castle County showed distinct differences in their IMR trends. While Wilmington extended its downward trend begun in 1996-2000, the balance of New Castle County's IMR has increased every year since the 1993-1997 time period.

Overall, Wilmington has experienced the greatest decline in IMRs. Since 1989-1993, the IMR has decreased 36.7 percent.

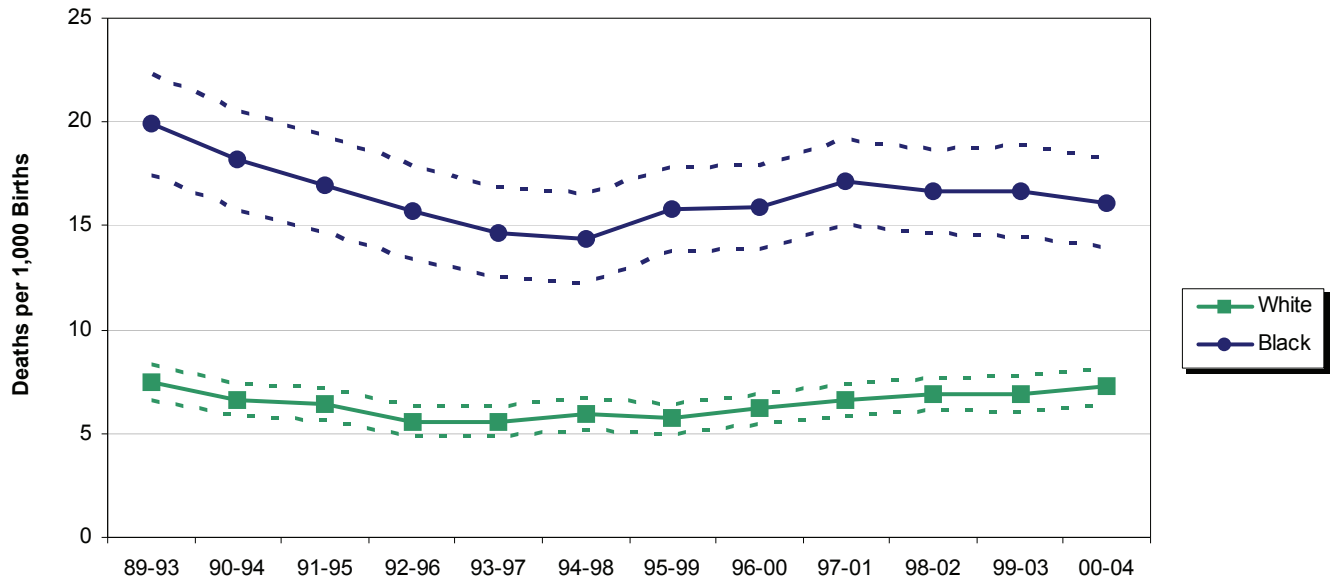
**Five-year Average Infant Mortality Rates  
Delaware Counties and City of Wilmington, 1989-2004**



## INFANT MORTALITY

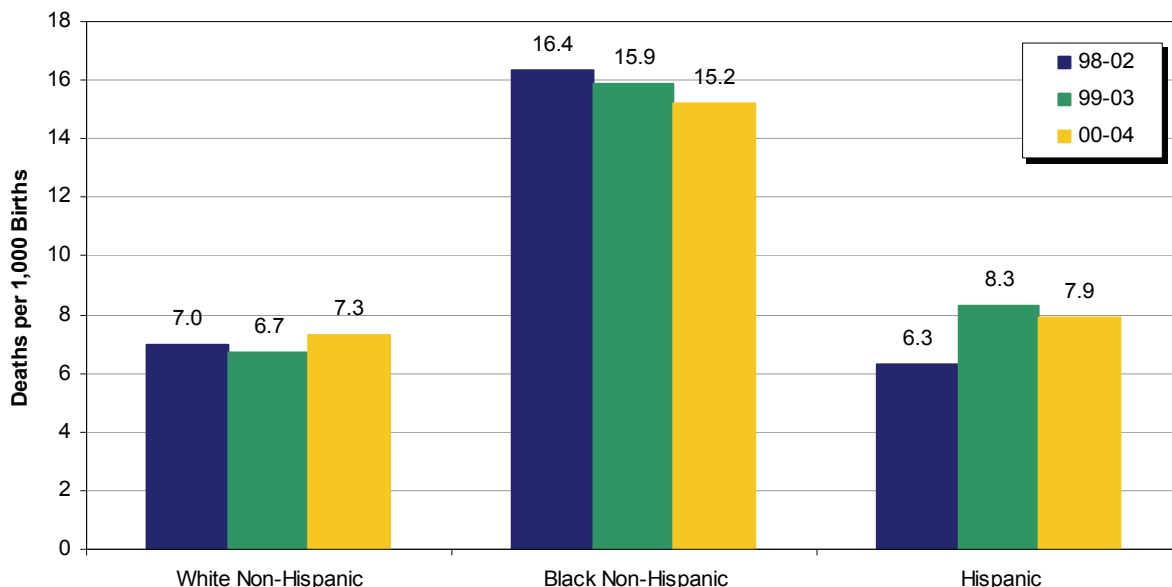
From 1999-2003 to 2000-2004, the 5-year infant mortality rate rose slightly due to an increase in the white IMRs (from 6.9 to 7.3); black IMRs decreased from 16.7 to 16.1 during the same time period. As shown in the graph below, black infants experienced significantly higher mortality rates than white infants, and from 1989-1993 to 2000-2004, black IMRs were anywhere from 2.2 to 2.8 times that of white IMRs.

**Five-year Average Black and White Infant Mortality Rates with Confidence Limits  
Delaware, 1989-2004**



Significant disparities existed between black non-Hispanic IMRs and each of the two other groups, white non-Hispanic and Hispanic. Black non-Hispanics had the highest IMR in all three time periods, and their rate of 15.2 deaths per 1,000 live births, was more than double the white non-Hispanic rate of 7.3.

**Five-year Average Infant Mortality Rates by Race and Hispanic Origin  
Delaware, 1998-2004**



## INFANT MORTALITY

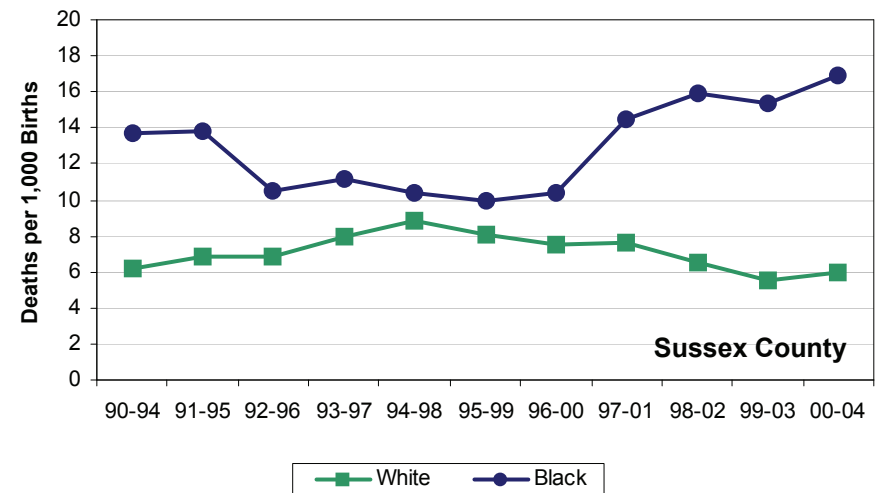
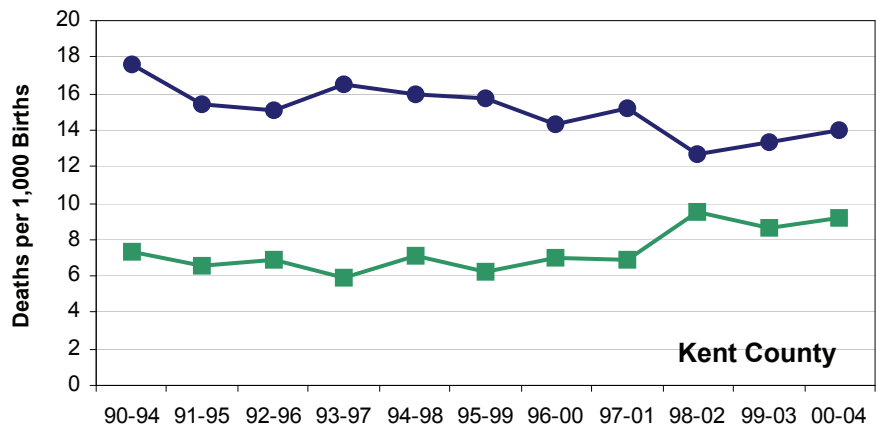
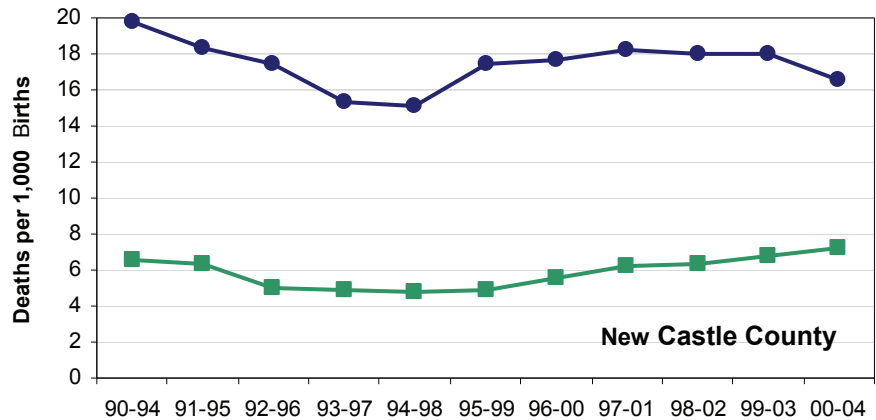
Not only did IMRs vary between counties, but rates varied between races within each county. Black IMRs were consistently higher than white IMRs in all three counties, and for every time period. To gauge the disparity between black and white IMRs, disparity ratios<sup>1</sup> were used. However, as is shown in the graphs to the right, both the disparity ratio and the rate should be considered when examining the issue of infant mortality.

An increase in the white IMR and a corresponding decrease in the black IMR caused New Castle county's disparity ratio to decline from 2.6 to 2.3, though its overall IMR decreased only slightly.

Though Kent county had the lowest disparity ratio (1.5) between black and white, it had the highest overall IMR, and both black and white IMRs increased from 1999-2003 to 2000-2004.

Sussex county's IMR increased due to a rise in its black IMR, which was the highest of all three counties and further widened the disparity between black and white IMRs to 2.9.

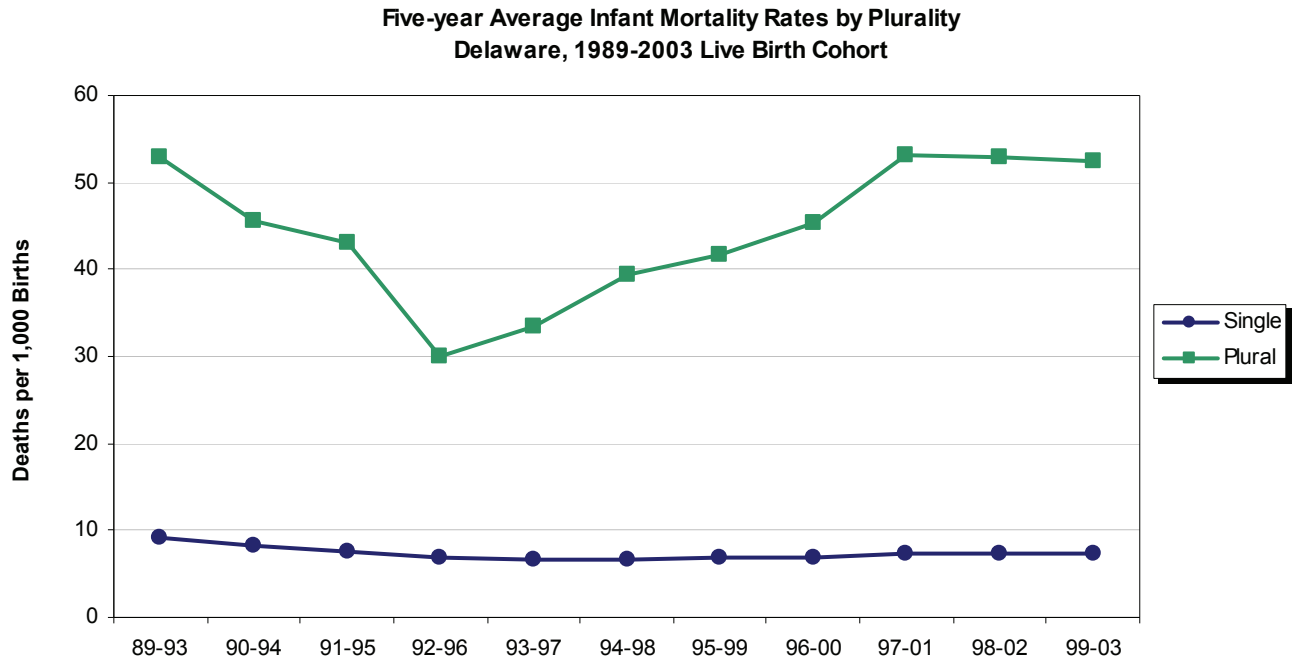
Five-year Average Infant Mortality Rates by Race  
Delaware Counties, 1990-2004



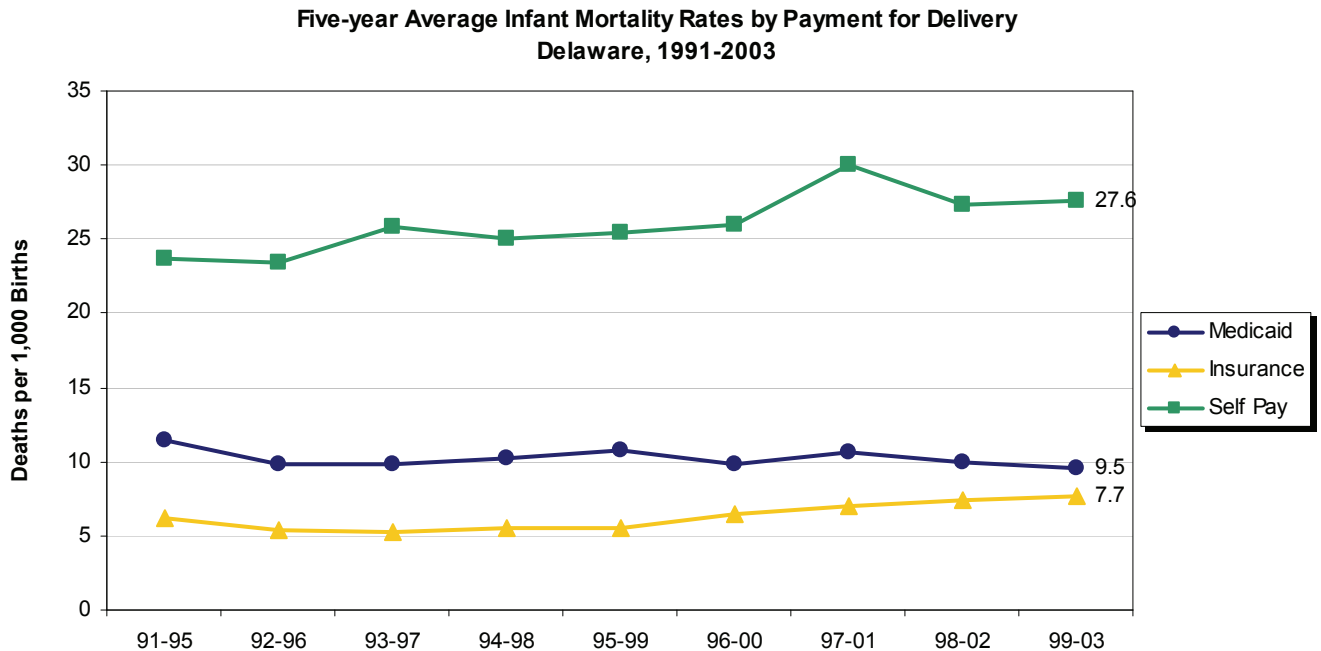
1. Disparity ratios were calculated by dividing the black IMR by the white IMR; the resulting number demonstrated the magnitude of difference between black and white.

## INFANT MORTALITY - Live Birth Cohort

A significantly higher incidence of infant mortality occurred in plural births than in singleton births. After increasing 77 percent from its low in 1992-1996 to its peak in 1997-2001, the five-year average IMR for plural births leveled off at a rate more than seven times the IMR for single births (52.3 versus 7.3 infant deaths per 1,000 births in 1999-2003).



Though infants born to uninsured mothers had an IMR two to three times higher than infants whose deliveries were paid for by Medicaid or private insurance, they only accounted for 2.8 percent of all live births in 1999-2003. Infants born to mothers who were privately insured accounted for 60 percent of all live births and their IMR has risen 49 percent since 1993-1997, to 7.7 deaths per 1,000 births in 1999-2003. The IMR for infants whose deliveries were paid for by Medicaid decreased 3 percent since 1993-1997, to 9.5 in 1999-2003.

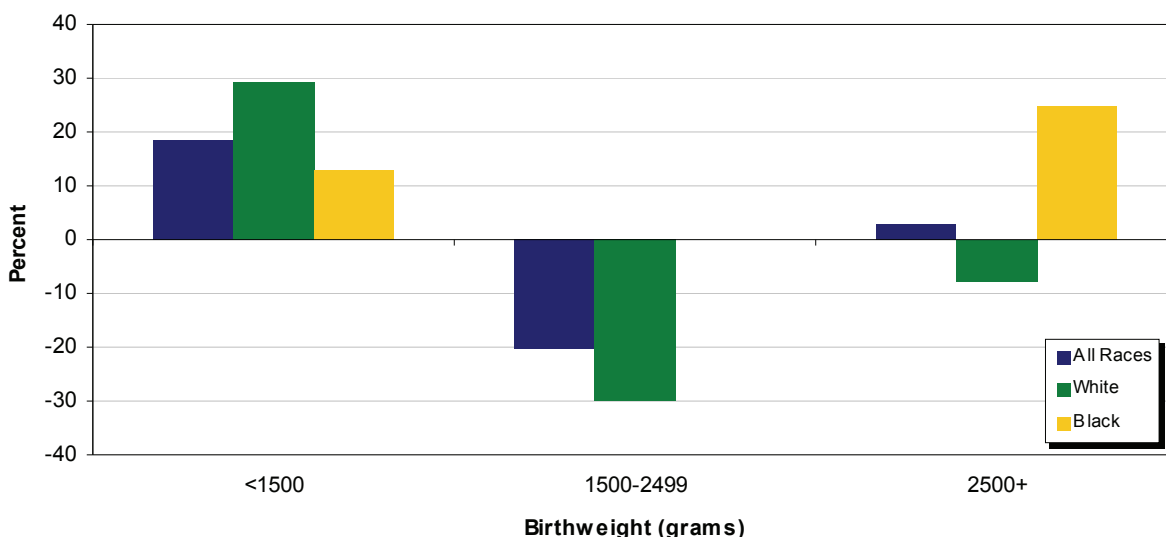


## INFANT MORTALITY - Live Birth Cohort

In the 1993-2003 live birth cohort, it was evident that the increase in infant mortality rates was greatly influenced by the increase in mortality rates of very low birthweight (<1500 grams) infants of both races.

Over the same time period, white mortality rates for moderately low (1500-2499 grams) and normal (2500+ grams) birthweight infants decreased, while black mortality rates for moderately low birthweight infants were unchanged and those for normal birthweight infants increased by 24.8 percent.

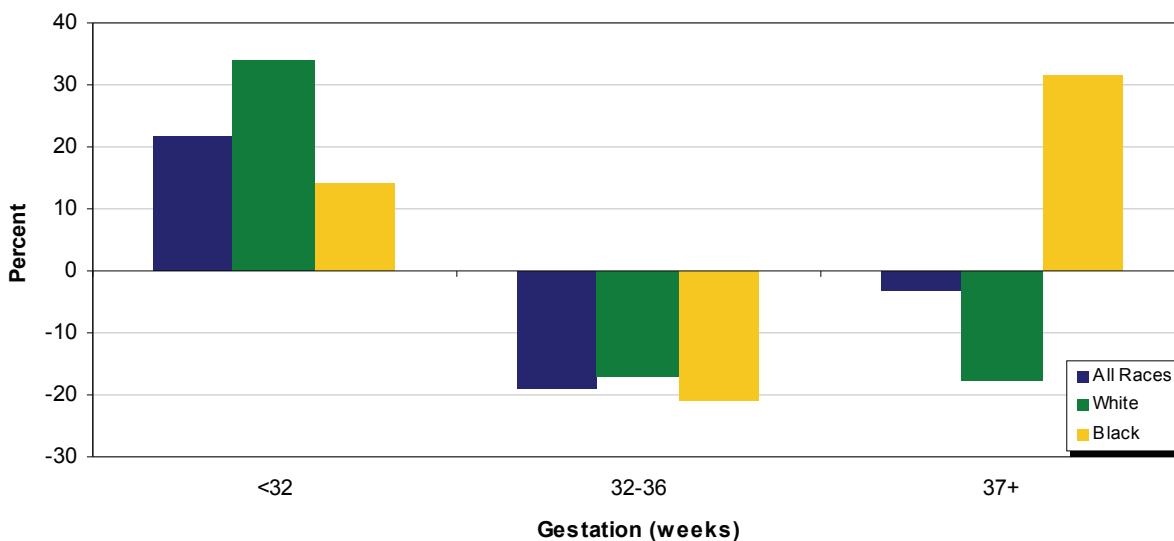
**Percent Change in Five-year Average Infant Mortality by Birthweight and Race  
Delaware, Live Birth Cohort, 1993-1997 to 1999-2003**



Like birthweight, an infant’s gestational age is considered one of the most important predictors of infant health and mortality risk. Infants born too small or too early have a much greater risk of mortality than those who reach a normal weight (2500+ grams) or full-term gestation (37+ weeks).

Similar to the trends shown above, infant mortality rates for very premature (<32 weeks) infants increased for both races in the 1993-1997 to 1999-2003 time period. Infant mortality rates of moderately premature (32-36 weeks) infants decreased for both races, while rates for black full-term (37+ weeks) infants increased and rates for full-term white infants decreased.

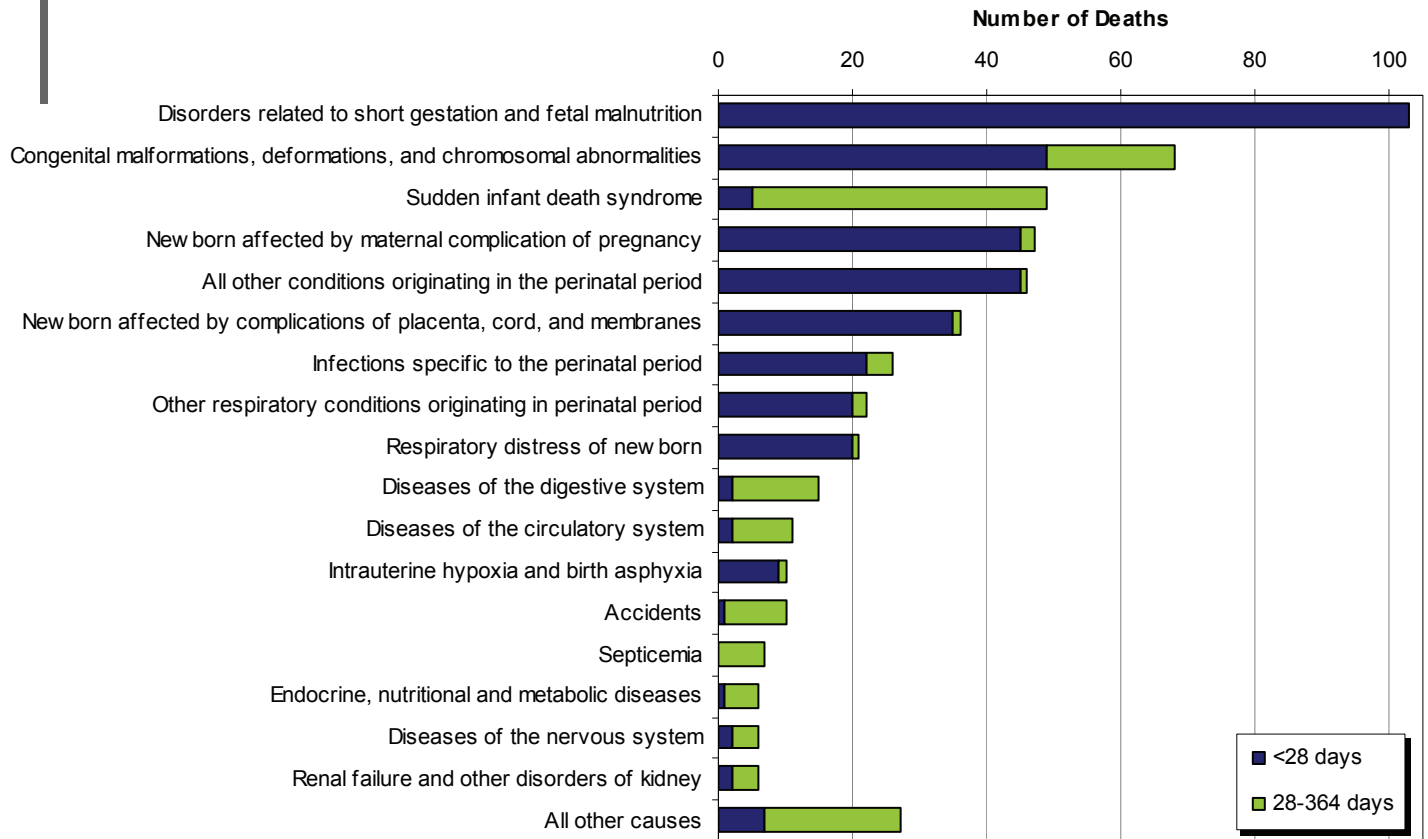
**Percent Change in Five-year Average Infant Mortality by Gestation and Race  
Delaware, Live Birth Cohort, 1993-1997 to 1999-2003**



## INFANT MORTALITY - Leading Cause of Death

Approximately 95 percent of all infant deaths occurred within the first six months of life, and 70 percent of all infant deaths occurred within the first 28 days of life. The graph below displays deaths by specific cause and the infant's age classification at death, neonatal (<28 days) or postneonatal (28-364 days).

**Leading Causes of Infant Death  
Delaware, 2000-2004**



- Disorders related to short gestation and fetal malnutrition accounted for the greatest number of infant deaths in 2000-2004; all of these deaths occurred in the neonatal period.
- Sudden infant death syndrome (SIDS) is the only one out of the top five causes of death that has the majority of deaths occurring in the postneonatal period, with a mean age at death of 77 days.
  - ⇒ 28.6 percent (14 out of 49) of the SIDS deaths were associated with co-sleeping with adults and/or sleeping on soft surfaces, such as couches and adult beds. During that same time period, there were 9 additional infant deaths, coded under a different cause of death, that were associated with co-sleeping and/or sleeping on a soft surface.

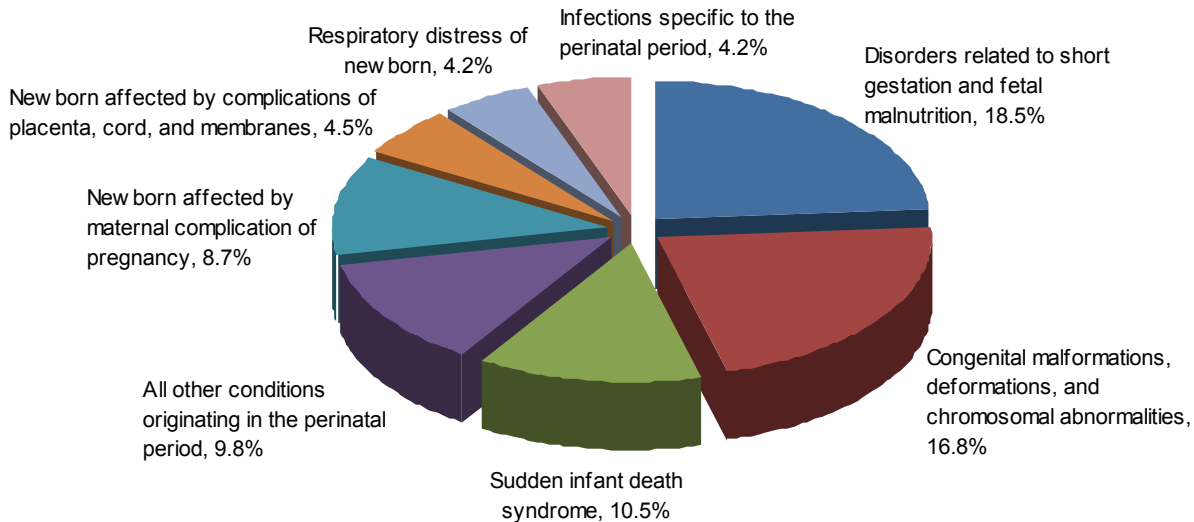
## INFANT MORTALITY

In 2000-2004 the three leading causes of infant death were:

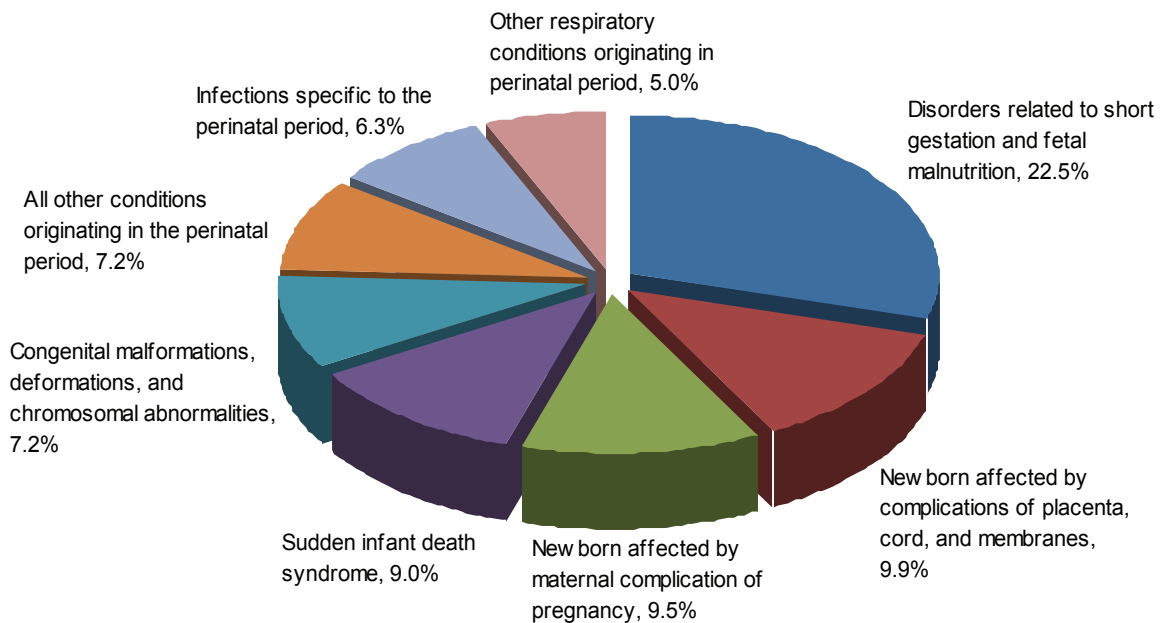
- Disorders related to short gestation and fetal malnutrition (20.0 percent of infant deaths),
- Congenital anomalies (13.2 percent of infant deaths), and
- Sudden infant death (9.5 percent of infant deaths).

While disorders related to short gestation and fetal malnutrition was the top cause of death for both black and white infants, the number 2 and 3 spots varied by race, as shown in the pie charts below.

**2000-2004 Leading Causes of White Infant Death**



**2000-2004 Leading Causes of Black Infant Death**



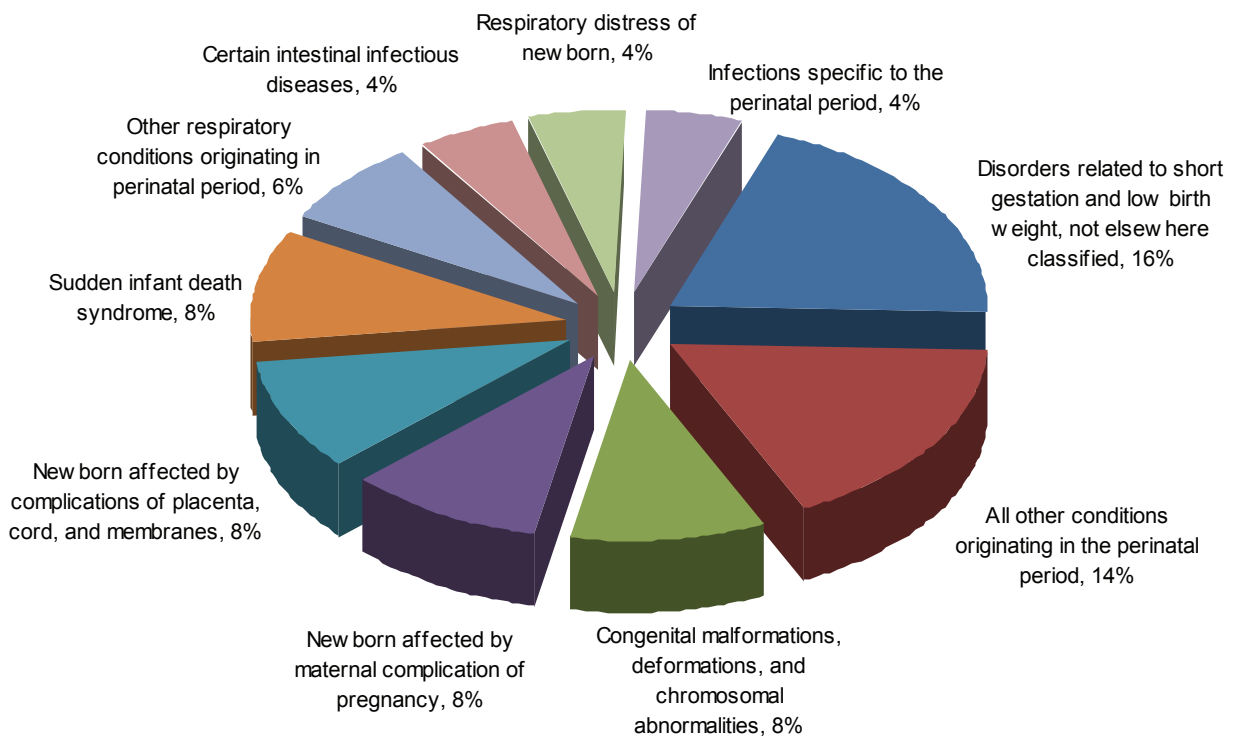


## INFANT MORTALITY

In the 1989-1993 time period, Hispanics accounted for approximately 3 percent of all live births and infant deaths, since that time the proportion of births to Hispanics mothers has been increasing. In the most recent five year period, 2000-2004, 11.4 percent of all live births were to Hispanic mothers, and 9.7 percent of all infant deaths were of Hispanic origin.

The leading cause of death for infants of Hispanic origin was disorders related to short gestation and low birthweight, not classified elsewhere, followed by All other conditions originating in the perinatal period, which includes breech delivery complication, cardiac failure, bleeding, and digestive disorders.

**2000-2004 Leading Causes of Hispanic\* Infant Death**

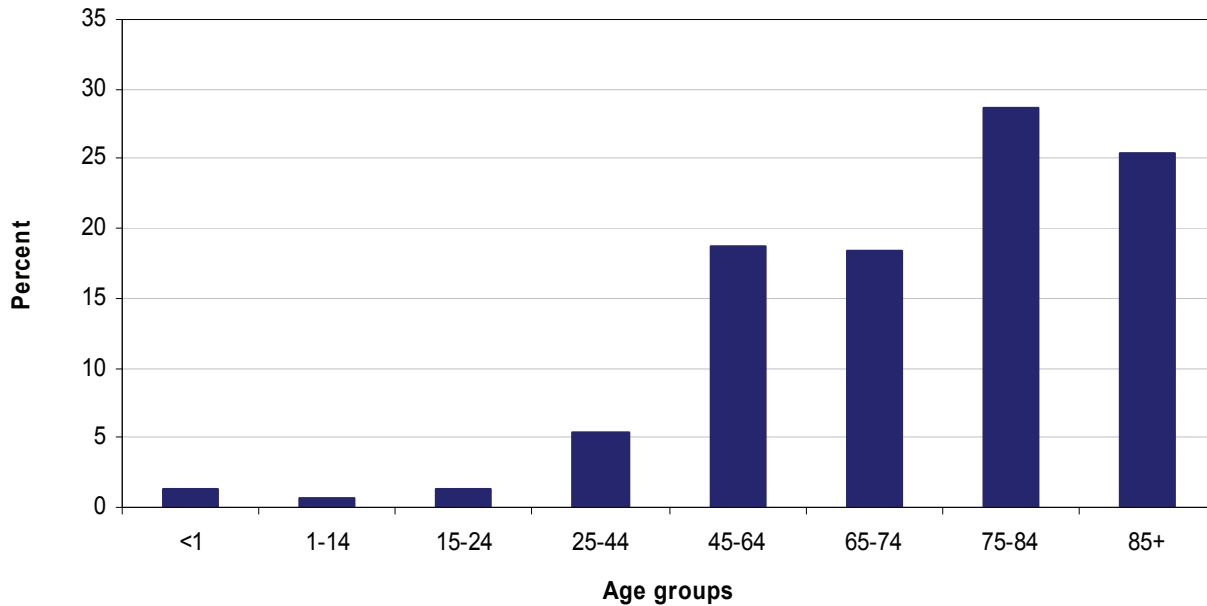


## MORTALITY

More Delaware residents died in 2004 than in 2003. A total of 7124 residents died, 97 of which were children under the age of 1. Among all Delaware deaths, 49.4 percent were females and 50.6 percent were males. Heart disease and cancer continued to be the leading and second leading causes of death, accounting for 53.8 percent of all deaths in 2004.

- One quarter of the Delawareans who died in 2004 were 85 or older. Deaths to those 75 and older accounted for more than half of all deaths.

**Percent of Deaths by Age  
Delaware, 2004**



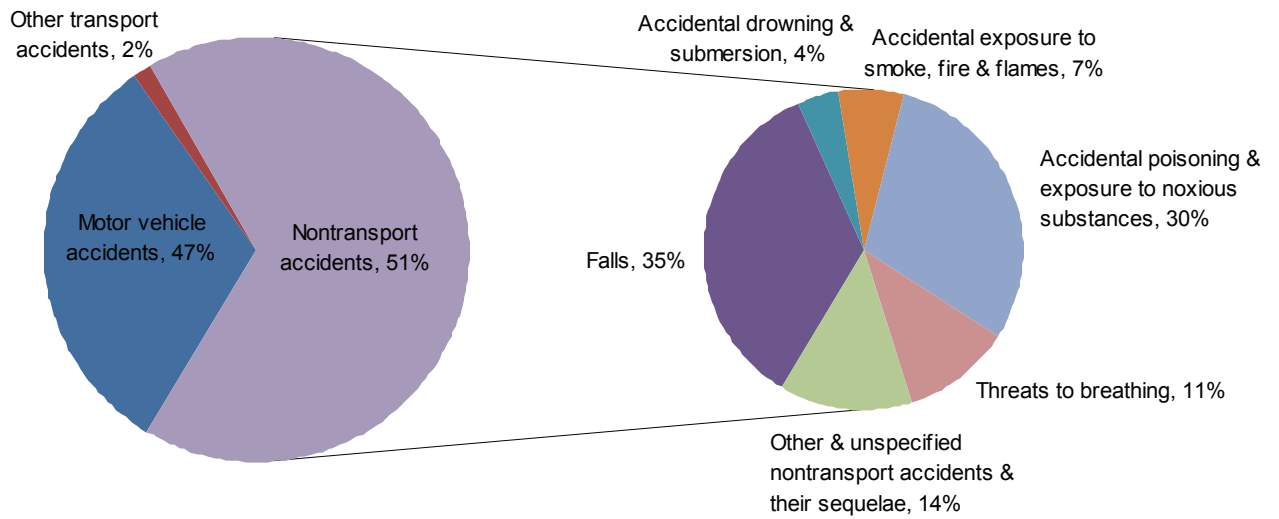
- A Delaware resident born in 2004 could expect to live an average of 77.8 years.
- Life expectancy at birth varied by race and sex; white females had the highest life expectancy (80.9) while black males had the lowest (70.4).
- In 2004, the ten leading causes of death for residents of all ages were almost identical to the top 10 in 2003, with the main difference being movement among the rankings.

Rank	Leading Cause of Death	Number
1	Diseases of the heart	2011
2	Malignant neoplasms	1822
3	Cerebrovascular diseases	348
4	Chronic Lower Respiratory Diseases	345
5	Accidents (unintentional injuries)	290
6	Diabetes mellitus	211
7	Alzheimers Disease	153
8	Influenza and pneumonia	144
9	Nephritis, nephrotic syndrome, and nephrosis	128
10	Septicemia	121

## MORTALITY

- There were 290 deaths due to accidents in 2004; 47 percent of which were due to motor vehicle accidents and 51 percent of which were due to nontransport accidents. More than half of the 147 nontransport accidents were caused by falls and unintentional poisonings and exposure to noxious substances.

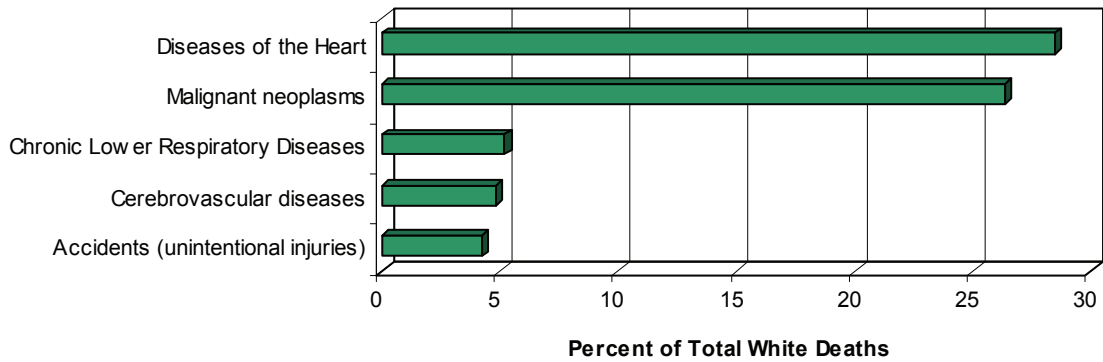
**Accidental Causes of Death by Specific Category of Accident  
Delaware, 2004**



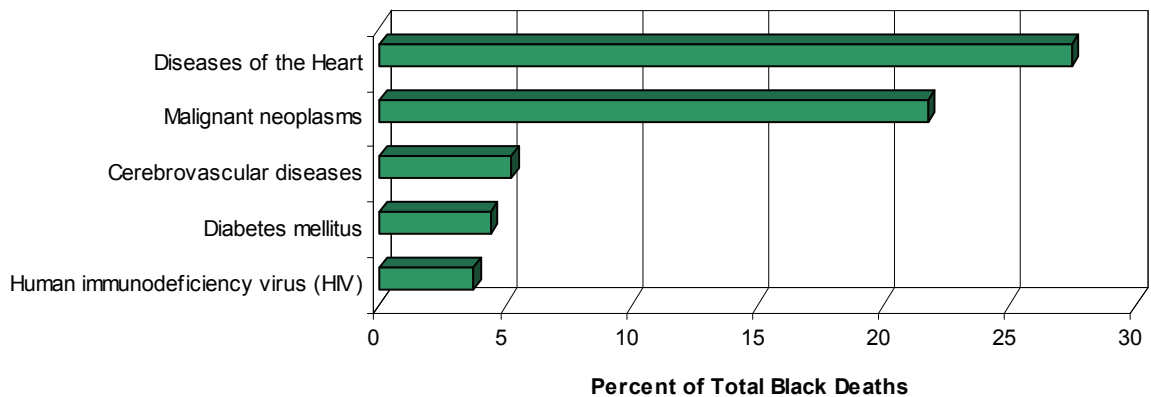
## MORTALITY

The leading causes of death varied by race and ethnic group. The top five leading causes of death for white, black, and Hispanic Delawareans are shown below.

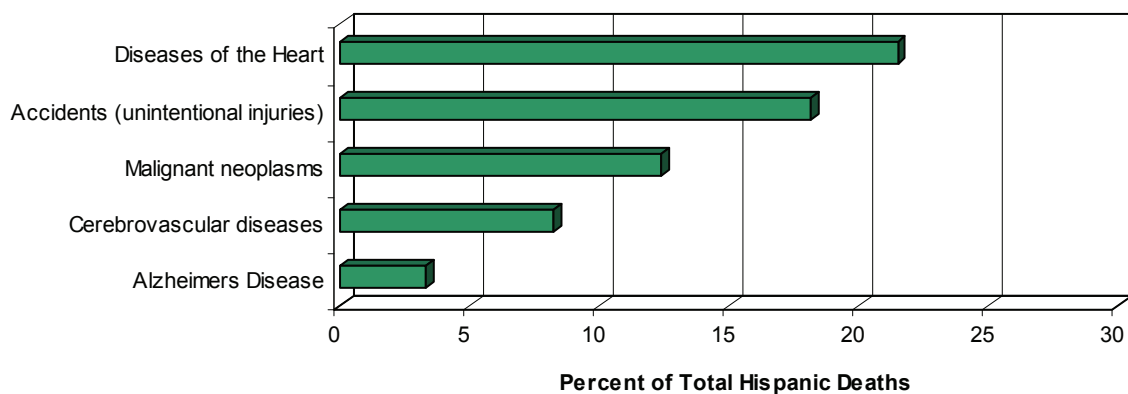
**White Leading Causes of Death  
Delaware, 2004**



**Black Leading Causes of Death  
Delaware, 2004**



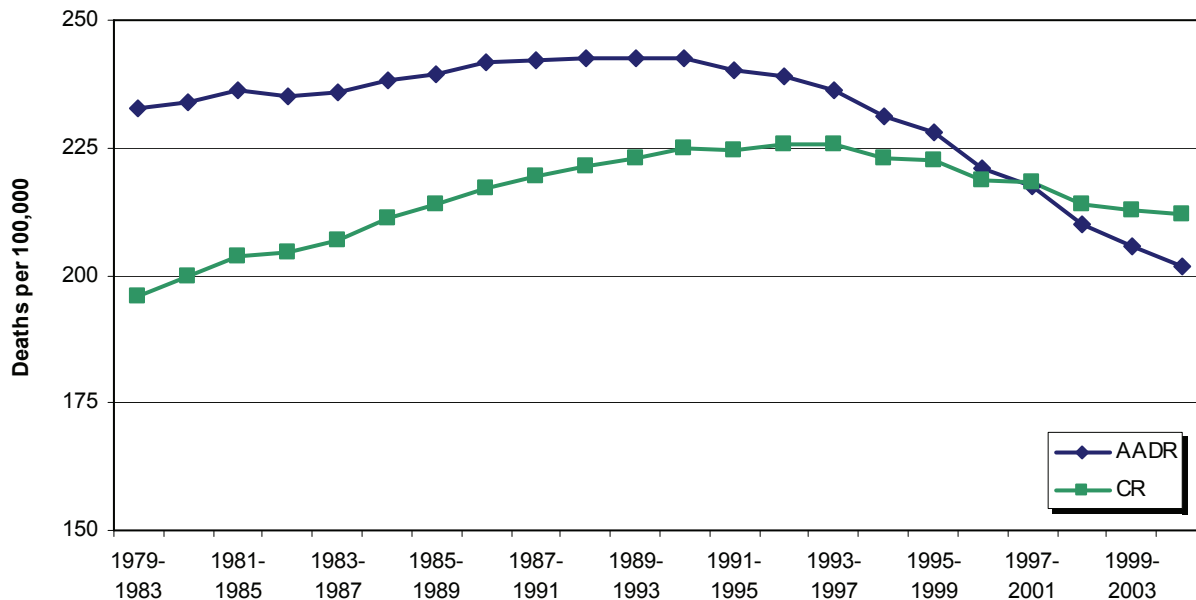
**Hispanic Leading Causes of Death  
Delaware, 2004**



## MORTALITY

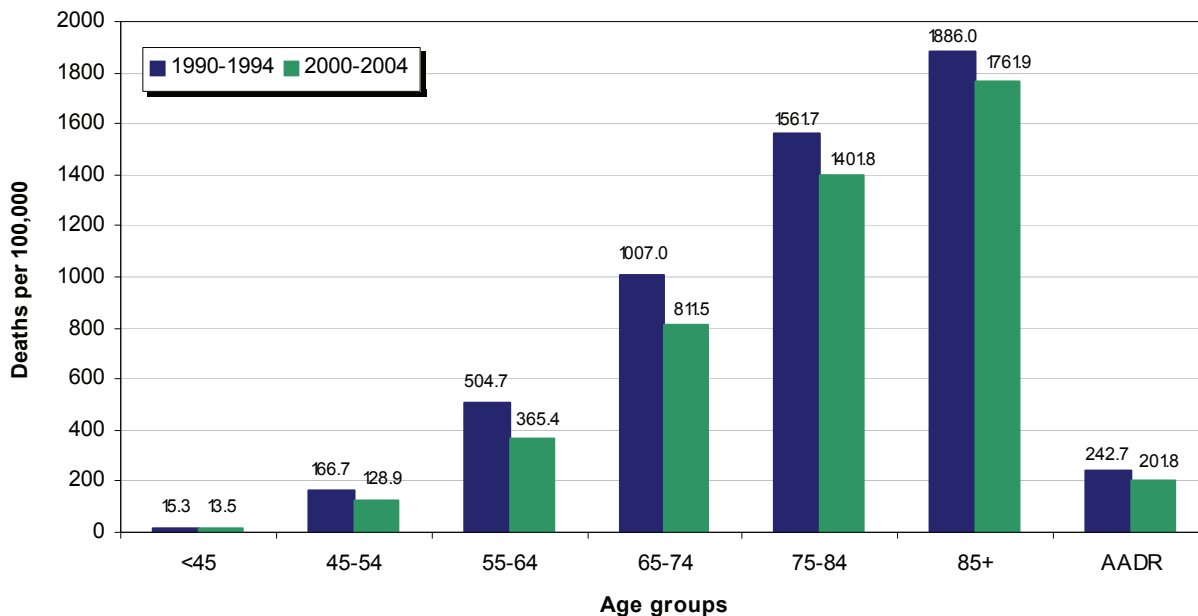
Though both the crude and age-adjusted rates showed cancer mortality rates declining since the early nineties, the age-adjusted death rate (AADR) showed a greater rate of decline than the crude rate, and over the last three time periods the AADR has been lower than the crude rate. AADRs declined more because they eliminated the changes in age distribution due to increases in the 75-84 and 85+ populations, which grew 49 and 54 percent from 1990-1994 to 2000-2004.

**Five-year Crude and Age-adjusted Cancer Mortality Rates  
Delaware, 1979-2004**



Age-adjusted cancer mortality rates peaked at 242.7 in 1990-1994, since then, they have declined 16.9 percent to 201.8 in 2000-2004. Age-specific death rates varied dramatically by age group, though rates for every age group declined between 1990-1994 and 2000-2004.

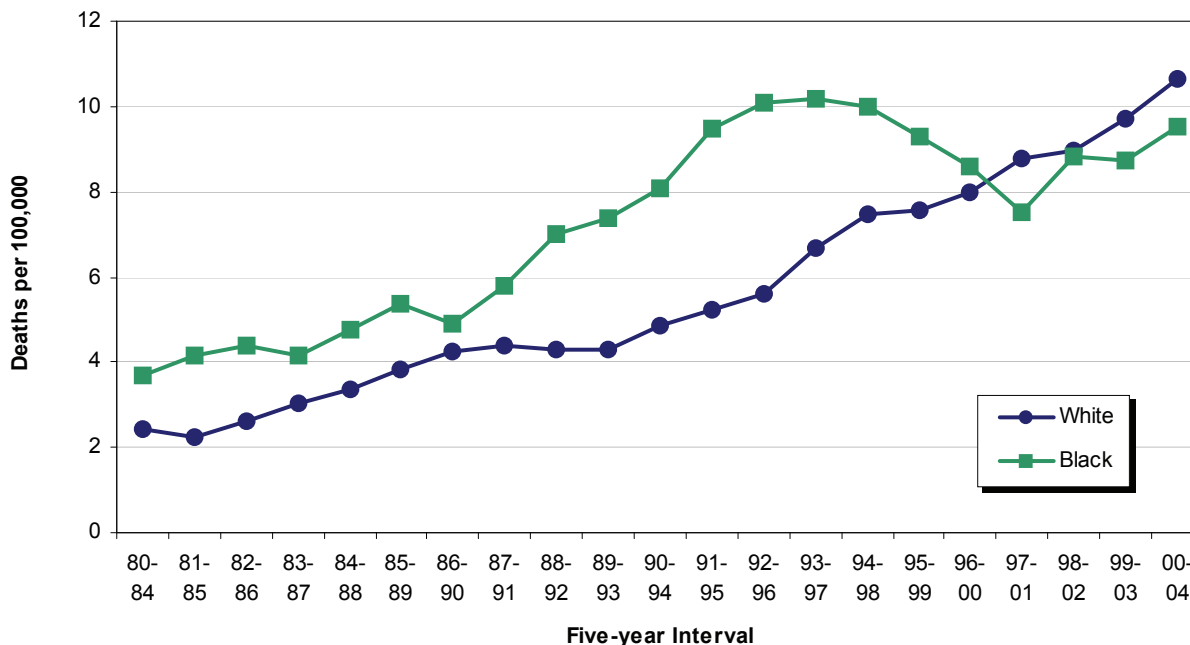
**Five-year Average Age-specific and Age-adjusted Cancer Mortality Rates  
Delaware, 1990-1994 and 2000-2004**



## MORTALITY

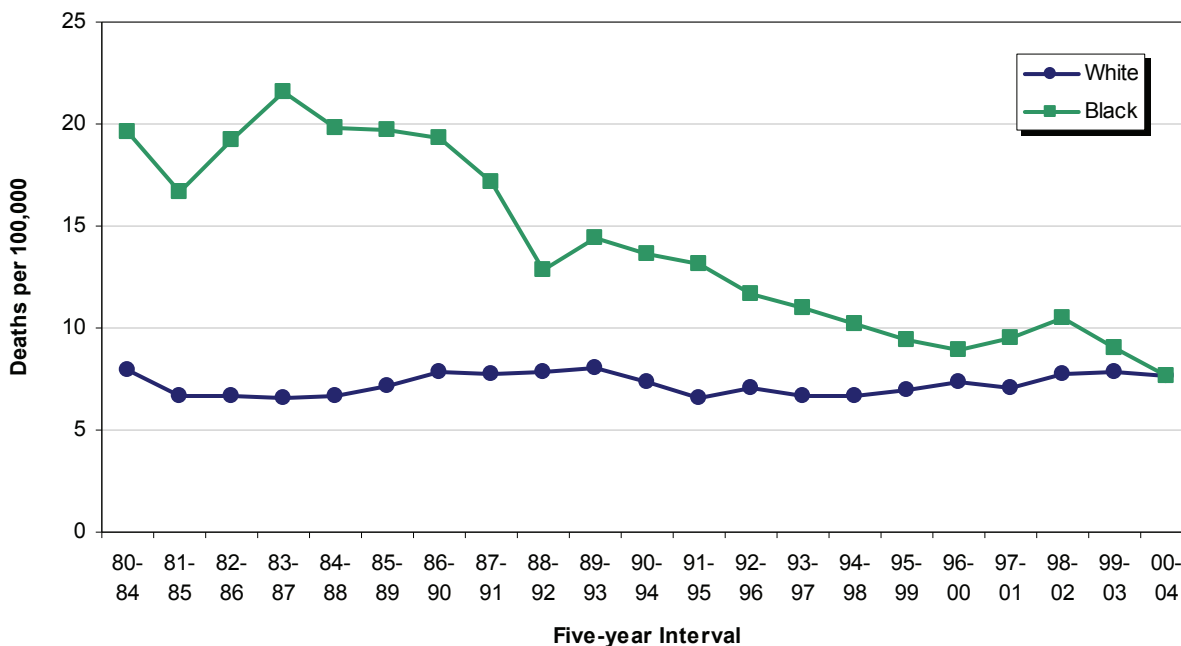
Though black mortality rates for drug-induced deaths were historically higher than white rates, in 1994-1998 they began a four year decline that allowed them to drop below white rates in 1997-2001. Since then, both black and white mortality rates have increased, with white rates remaining higher. Overall, white and black mortality rates for drug-induced deaths increased by 338 and 158 percent from 1980-1984 to 2000-2004.

**Five-year Age-adjusted Mortality Rates for Drug-induced Deaths by Race  
Delaware, 1990-2004**



While white rates for alcohol-induced deaths have remained fairly steady since 1980-1984, black rates have declined by 61 percent, and in 2000-2004 both races had a rate of 7.6 deaths per 100,000.

**Five-year Age-adjusted Mortality Rates for Alcohol-induced Deaths by Race  
Delaware, 1980-2004**

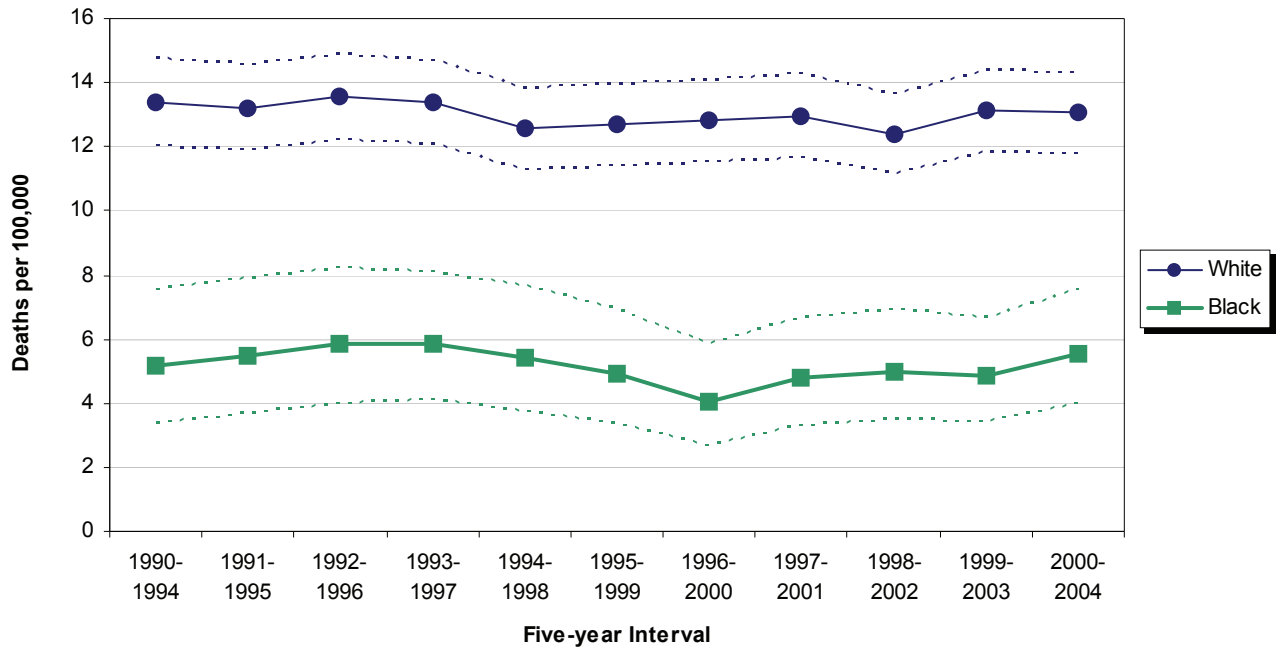


Over half of all drug-induced and alcohol-induced deaths in 2000-2004 were white males.

## MORTALITY

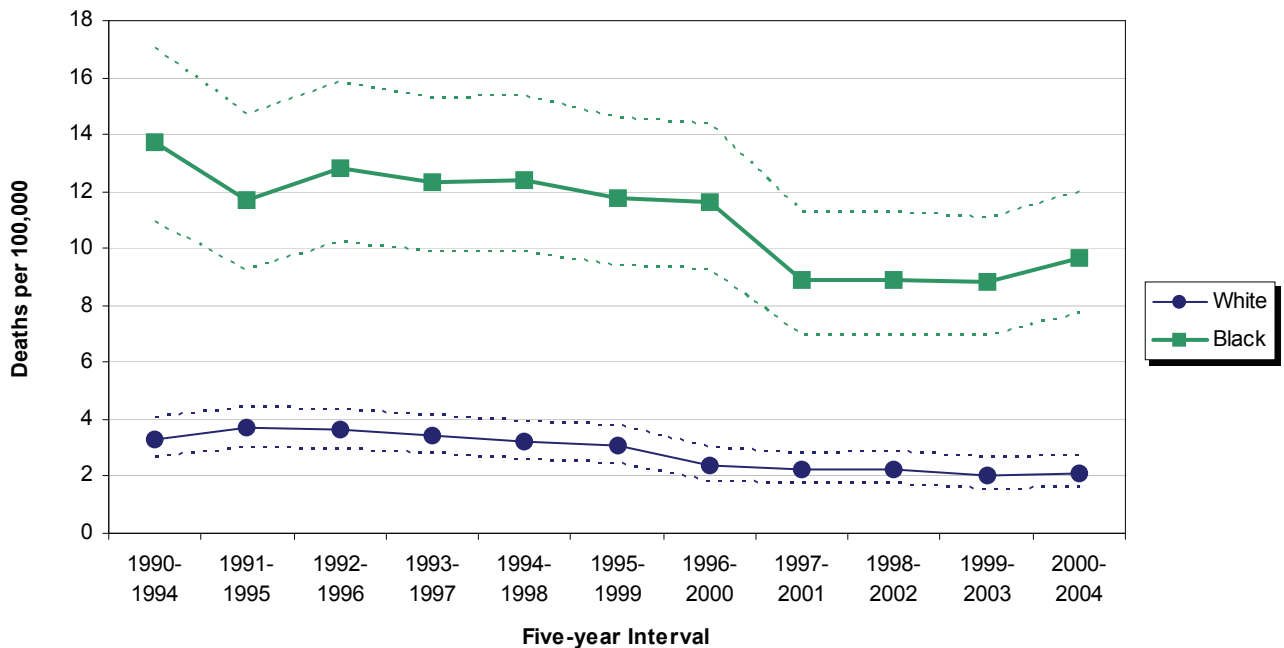
Suicide mortality trends for both black and white populations remained fairly stable from 1990-1994 to 2000-2004, with the white rate more than double that of the black rate.

**Five-year Age-adjusted Suicide Mortality Rates by Race  
Delaware, 1990-2004**



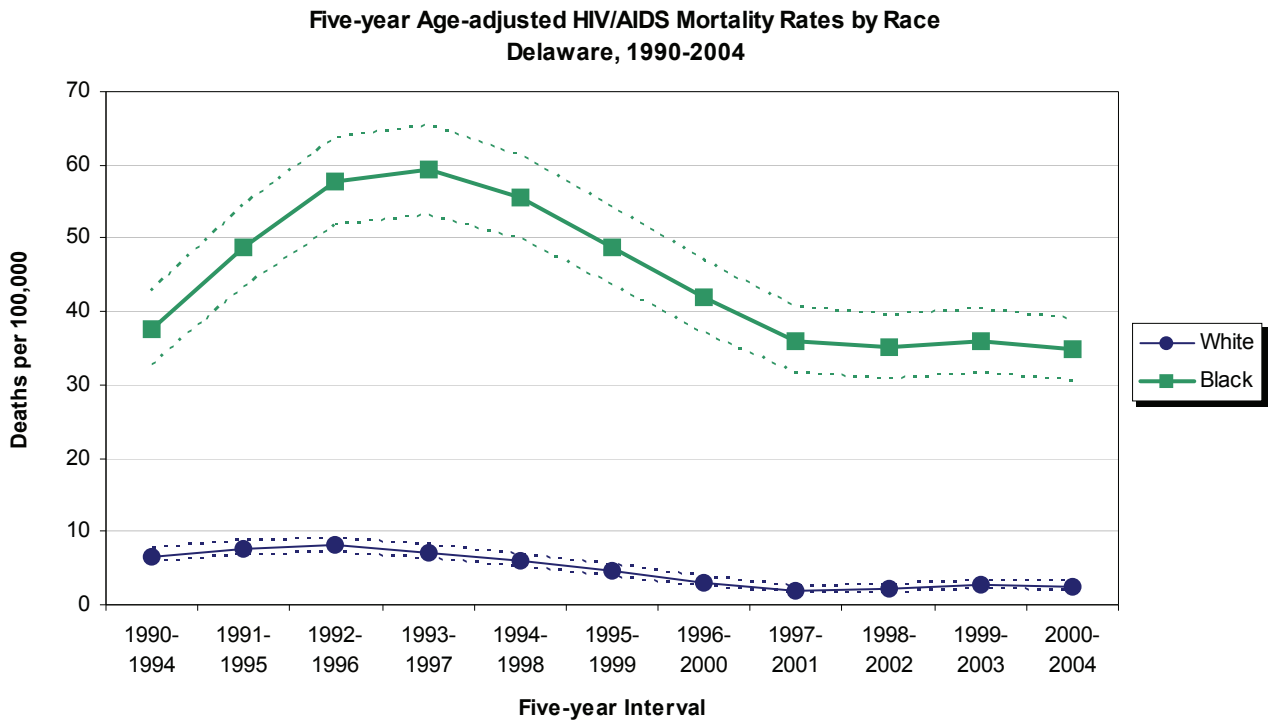
Both black and white homicide mortality rates have demonstrated a downward trend since 1990-1994, declining 29 and 36 percent. The recent increase (10.2 percent since 1999-2003) in the black homicide mortality rate made it 4.6 times higher than the white homicide mortality rate.

**Five-year Age-adjusted Homicide Mortality Rates by Race  
Delaware, 1990-2004**

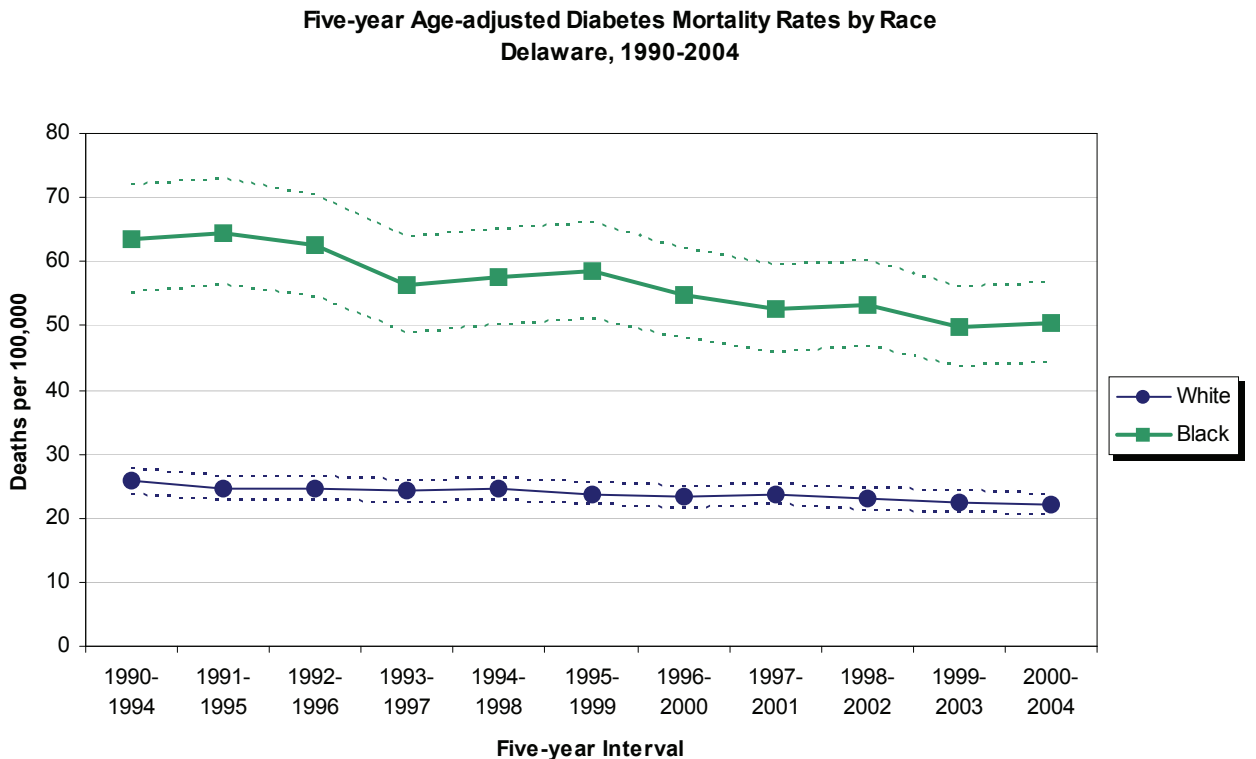


## MORTALITY

HIV/AIDS mortality has disproportionately affected Delaware's black population. Though black HIV/AIDS mortality rates have decreased significantly since their 1993-1997 peak, their 2000-2004 mortality rate of 34.8 deaths per 100,000 was 14 times that of whites. In the 2000-2004 time period, blacks accounted for 77 percent of all deaths due to HIV/AIDS.



Though black mortality rates for Diabetes have been declining since 1990-1994, they remained more than twice that of whites.

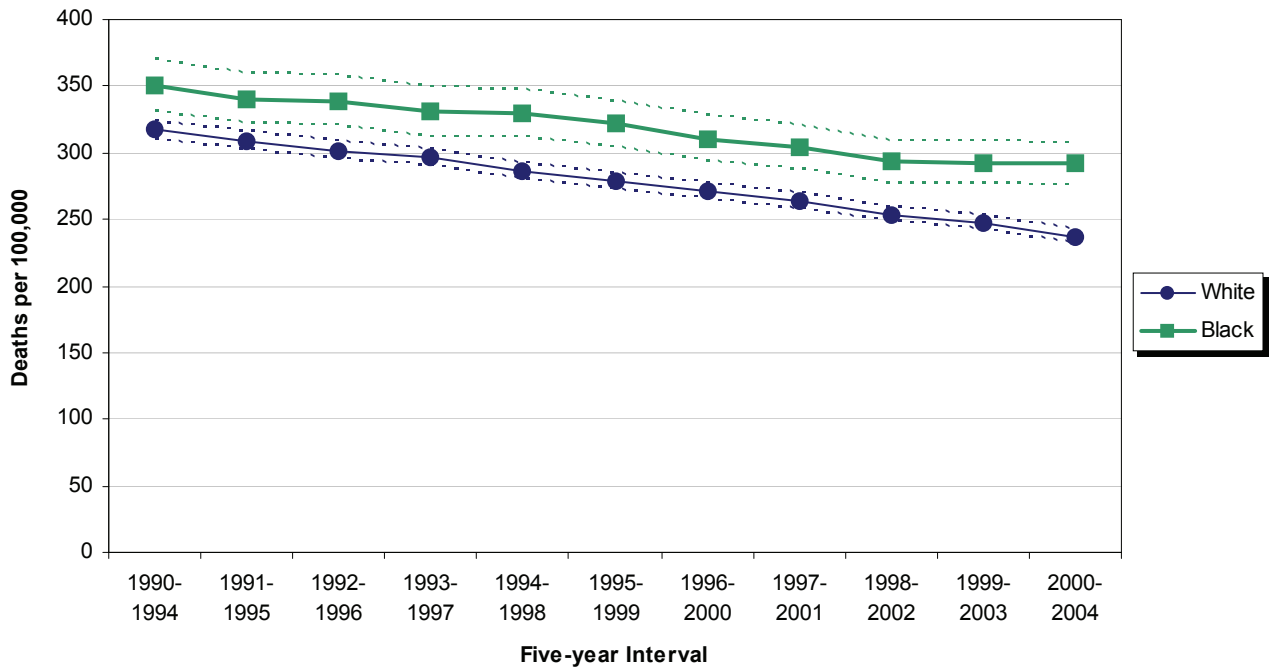




## MORTALITY

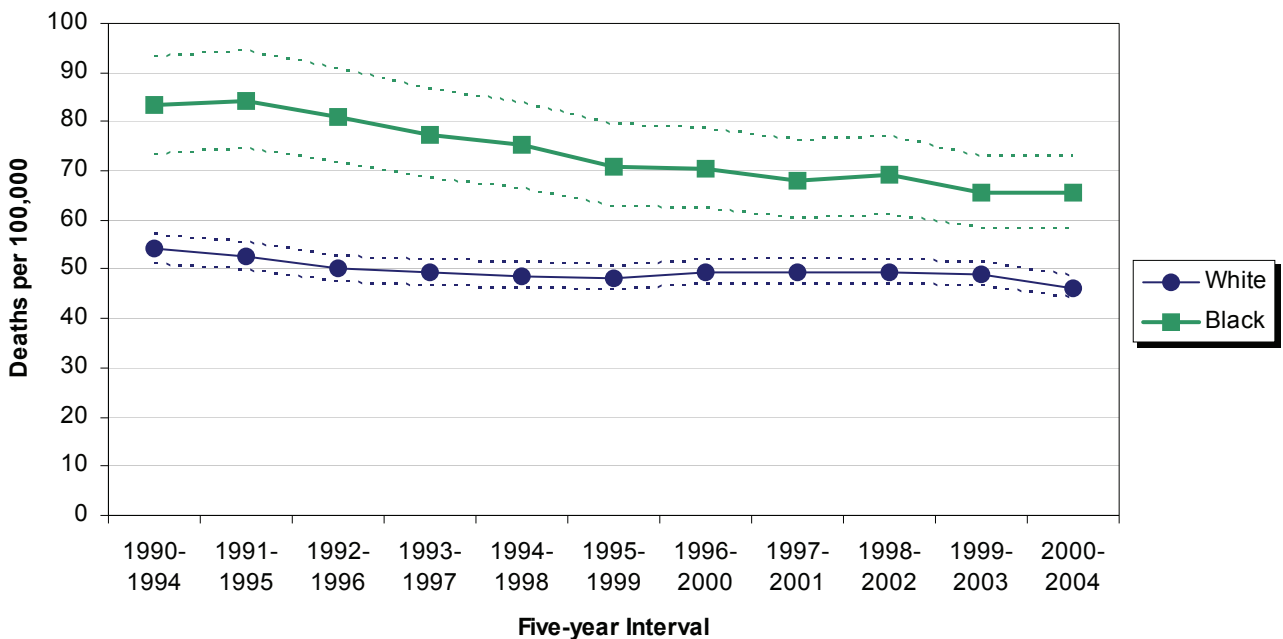
Heart disease remained the most common cause of death for both black and white Delawareans. Both black and white heart disease mortality rates have declined significantly since 1990-1994, though black rates continued to be higher than white rates.

**Five-year Age-adjusted Heart Disease Mortality Rates by Race  
Delaware, 1990-2004**



Stroke was the third leading cause of death for both blacks and whites in 2000-2004. Like heart disease, stroke mortality rates for both races continued their downward trends, though the black rates remained significantly higher than white rates.

**Five-year Age-adjusted Stroke Mortality Rates by Race  
Delaware, 1990-2004**



### BASIC DEFINITIONS

The following definitions apply throughout this report:

AGE-ADJUSTED MORTALITY RATE (Direct Method) is a method used to eliminate differences caused by variations in age composition, to allow comparisons between populations and over time. More specifically, age-adjustment involves weighting age-specific death rates by standard population weights. The standard population used in this report is the 2000 U.S. population.

AGE-SPECIFIC MORTALITY RATE is the number of deaths for a specified age group per 100,000 population in the same age group.

AGE-SPECIFIC FERTILITY RATE is the number of resident live births to women in a specific age group (e.g., 20-24 years) per 1,000 women in the same age group.

ANNULMENT is the invalidation or voiding of a marriage that confers on the parties the status of never having been married to each other.

BIRTH COHORT consists of all children born during a specific period of time.

BIRTH WEIGHT is the first weight of the fetus or newborn obtained after birth. This weight should be measured within the first hour of life before significant postnatal weight loss has occurred.

CAUSE OF DEATH refers to deaths classified by cause according to the International Classification of Diseases, Ninth & Tenth Revisions, of the World Health Organization.

CRUDE BIRTH RATE is the total number of resident live births per 1,000 total population. It is generally used as a measure of population growth due to childbirth. Crude birth rates are not measures of fertility. When fertility is the topic of interest, general or age-specific fertility rates are more appropriate.

CRUDE MORTALITY RATE is expressed as the total number of deaths per 100,000 population. The crude rate is misleading if one wants to make comparisons between different populations when the age-race-sex distributions of the populations are not similar.

DEATH is the permanent disappearance of any evidence of life at any time after live birth.

DIVORCE is the final legal dissolution of a marriage.

EDUCATION is the highest level of formal education completed.

## DEFINITIONS & RATES

FETAL DEATH is a death prior to the complete expulsion or extraction from the mother of a product of conception, which weighs at least 350 grams or if weight is unknown, reached at least 20 weeks of gestation; the death is indicated by the fact that, after such expulsion or extraction, the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles. Heartbeats are to be distinguished from transient cardiac contractions; respirations are to be distinguished from fleeting respiratory efforts or gasps.

FIVE-YEAR AVERAGE RATE is the number of vital events (births, infant deaths, etc.) that took place during a particular five-year period per 1,000 or 100,000 population (or other appropriate denominator).

GENERAL FERTILITY RATE is the total number of resident live births per 1,000 women of childbearing age (i.e., 15-44 years).

INTERNATIONAL CLASSIFICATION OF DISEASES, TENTH REVISION (ICD-10) is an internationally recognized system of processing, classifying, and presenting mortality statistics, implemented in 1989.

INDUCED TERMINATION OF PREGNANCY means the purposeful interruption of an intrauterine pregnancy with the intention other than to produce a live-born infant, and which does not result in a live birth. This definition excludes management of prolonged retention of products of conception following fetal death.

INFANT DEATH is the death of a live-born infant occurring during the first year of life.

INFANT MORTALITY RATE measures the risk of death during the first year of life. It relates the number of deaths under one year of age to the number of live births during the same time period. It is expressed as the number of infant deaths per 1,000 live births. Since it is not dependent on a population census or estimate, it can be computed for any area and time period for which the numbers of infant deaths and live births are available.

LIVE BIRTH is the complete expulsion or extraction from the mother of a product of human conception, irrespective of the duration of pregnancy, which, after such expulsion or extraction, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles whether or not the umbilical cord has been cut or the placenta is attached. Heartbeats are to be distinguished from transient cardiac contractions; respirations are to be distinguished from fleeting respiratory efforts or gasps.

LIVE BIRTH ORDER indicates the numeric relationship of a newborn child to other children born alive to

## DEFINITIONS & RATES

the mother during previous deliveries.

LOW BIRTHWEIGHT refers to a newborn weighing less than 2,500 grams (5 pounds, 8 ounces).

MARRIAGE is the legal union of persons of opposite sex.

MEAN is one of three statistics commonly used to describe the average score in a large data set (the other two are the median and mode). The mean is obtained by summing the scores in a data set and dividing the result by the total number of scores. It is the statistic typically chosen when scores tend to cluster toward the middle of a distribution of scores ranked in order from low to high.

MEDIAN is one of three statistics commonly used to describe the average score in a large data set (the other two are the mean and mode). It is the score that falls exactly in the middle of the entire distribution of scores ranked in order from low to high such that 50 percent of the scores fall above it and 50 percent of the scores fall below it. If the number of scores is even, a value halfway between the two scores nearest the middle is used. It is the statistic typically chosen when scores tend to cluster toward one end of the ranked distribution. For example, median age at death is often reported because there tends to be clustering in the older age groups in mortality data.

MODE is one of three statistics commonly used to describe the average score in a large data set (the other two are the median and mean). It is the most frequently occurring score or category in a data set. It is the statistic typically chosen when scores tend to cluster in more than one part of a distribution of scores ranked in order from low to high. It is also used for nominal variables (i.e., variables with categories that have no numerical meaning or specific logical order) such as cause-of-death. For example, the most frequent cause-of-death (i.e., the mode for the cause-of-death) is heart disease.

NEONATAL DEATH is the death of a live-born infant before the infant becomes 28 days old (up to and including 27 days, 23 hours, 59 minutes from the moment of birth).

NEONATAL MORTALITY RATE measures the risk of death before reaching 28 days of life. This rate relates the number of deaths to infants less than 28 days of age to the total number of live births. It is expressed as the number of neonatal deaths per 1,000 live births.

OCCURRENCE DATA refer to vital events reported by the place where the event actually occurred. When occurrence data are reported for Delaware, the numbers include only those events that took place in Delaware,

## DEFINITIONS & RATES

regardless of the place of residence of the individuals involved. Marriages, divorces, and annulments are reported as occurrence data.

PLURALITY represents the number of siblings born as the result of a single pregnancy.

POSTNEONATAL DEATH is the death of a live-born infant of 28 days to 364 days of age.

POSTNEONATAL MORTALITY RATE measures the risk of death during the period from 28 to 364 days of age. It is expressed as the number of postneonatal deaths per 1,000 live births.

REPORTED PREGNANCY is a live birth, fetal death, or induced termination of pregnancy reported via the vital statistics system.

REPORTED PREGNANCY RATE is the total reported pregnancies (live births, fetal deaths, and induced terminations of pregnancy) per 1,000 women in a particular age group.

RESIDENCE DATA refer to vital events reported by the usual place of residence for the persons to whom the events took place. When residence data are reported for Delaware, the numbers include events taking place to Delaware residents in and outside of Delaware. For births and fetal deaths, residence is defined as the mother's usual place of residence. For deaths, residence is defined as the decedent's usual place of residence. Unless otherwise noted, the numbers in all tables and figures provided in this report are residence data.

TEENAGE FERTILITY RATE is the number of resident live births to women 15-19 years of age per 1,000 women 15-19 years of age.

UNDERLYING CAUSE OF DEATH is either the disease or injury that initiated a chain of events leading directly to death or the circumstances of an accident or violence, which produced a fatal injury.

VERY LOW BIRTHWEIGHT refers to a newborn weighing less than 1,500 grams (3 pounds, 5 ounces).

WEEKS OF GESTATION are the number of weeks elapsed between the first day of the last normal menstrual period (LMP) and the date of birth. When the date of the LMP is incompletely reported or the length of gestation as computed from the LMP is inconsistent with the reported birth weight, the "clinical estimate of gestation" is used. Gestations of fewer than 17 weeks or more than 47 weeks are coded as unknown. For more information, see the Technical Notes section of this report.

### RATES

The simplest method of making comparisons among groups of people is to compute relative figures such as rates. A rate is obtained by a process of division, in which the numerator represents the number of times an event has occurred within a particular time period and the denominator enumerates the total number of individuals exposed to the risk of that event during the same time period. The ratio of these two numbers is generally multiplied by 100, 1,000 or 100,000 to avoid decimal numbers beginning with zeros (see following two pages).

In computing rates, it is necessary that the numerator (i.e., the number of events) be defined according to (a) the nature of the event in question, (b) the geographical area and/or social group to which the event belongs, and (c) the time period when the event occurred. The denominator (i.e., the "population at risk") should correspond to the numerator in all the above respects. The more specifically one can define the "population at risk", the more meaningful the rate will be. For example, the crude birth rate, which compares the number of births to the total population, is not nearly as informative as the general fertility rate. This second rate uses only the number of women of childbearing age (15-44) for comparative purposes and therefore more specifically defines the "population at risk."

In general, rates will not be presented for events which have numerators less than 20, or in cases where the population estimates are not produced by the Delaware Population Consortium (DPC). For example, Hispanic mortality has not normally been reported in terms of rates due to the following reasons: Hispanics experience a relatively small number of deaths and the only available population estimates, produced by the U.S Census Bureau, have been subject to questions regarding their accuracy, both of which contribute to high variability in rates. Though there are a few exceptions to this rule, the Hispanic rates generated are more for illustrative purposes and should be interpreted with caution.

Formulas for the most common rates used in this report are provided on the following two pages.

CALCULATION OF RATES

$$\text{Crude Birth Rate} = \frac{\text{Number of Live Births}}{\text{Total Population}} \times 1,000$$

$$\text{General Fertility Rate} = \frac{\text{Number of Live Births}}{\text{Female Population Ages 15-44}} \times 1,000$$

$$\text{Teenage Fertility Rate} = \frac{\text{Number of Live Births to Women Ages 15-19}}{\text{Female Population Ages 15-19}} \times 1,000$$

$$\text{Live Birth Order Fertility Rate} = \frac{\text{Number of Live Births of a Specific Live Birth Order}}{\text{Female Population Ages 15 - 44}} \times 1,000$$

$$\text{Age-Specific Fertility Rate} = \frac{\text{Number of Live Births in a Specific Age Group}}{\text{Female Population in the Same Specific Age Group}} \times 1,000$$

$$\text{Reported Pregnancy Rate} = \frac{\text{Number of Reported Pregnancies in a Specific Age Group}}{\text{Female Population in the Same Specific Age Group}} \times 1,000$$

$$\text{Crude Mortality Rate} = \frac{\text{Number of Deaths}}{\text{Total Population}} \times 100,000$$

$$\text{Age-Specific Mortality Rate} = \frac{\text{Number of Deaths in a Specific Age Group}}{\text{Population in the Same Specific Age Group}} \times 100,000$$

## DEFINITIONS & RATES

$$\text{Age-adjusted Death Rate} = \sum_i W_i \cdot \left( \frac{\# \text{Deaths}_i}{\text{Pop}_i} \times 100,000 \right)$$

$$\text{where } W_i = \frac{\text{Standard Population}_i}{\text{Total Standard Population}}$$

and  $i$  = agegroup

$$\text{Marriage Rate} = \frac{\text{Number of Marriages}}{\text{Total Population}} \times 1,000$$

$$\text{Divorce Rate} = \frac{\text{Number of Divorces and Annulments}}{\text{Total Population}} \times 1,000$$

$$\text{Infant Mortality Rate} = \frac{\text{Number of Infant Deaths}}{\text{Total Live Births}} \times 1,000$$

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of Neonatal Deaths}}{\text{Total Live Births}} \times 1,000$$

$$\text{Postneonatal Mortality Rate} = \frac{\text{Number of Postneonatal Deaths}}{\text{Total Live Births}} \times 1,000$$



### **SOURCES OF DATA**

**BIRTHS, DEATHS, FETAL DEATHS, MARRIAGES, AND DIVORCES:** Birth, death, fetal death, marriage, and divorce certificates were the source documents for data on vital events to Delaware residents.

**INDUCED TERMINATIONS OF PREGNANCY:** Beginning on January 1, 1997, all induced terminations of pregnancy (ITOP) were required to be reported to the Department. ITOP reports are filed directly with the DHSC. The reports are filed for statistical purposes only and are shredded and discarded when all reports for the data year have been coded. ITOP records are currently not being exchanged among the states, so events to Delaware residents occurring out-of-state are not included in this report.

**REPORTED PREGNANCIES:** Reported pregnancies refer to live births, fetal deaths, and induced terminations of pregnancy (ITOP). It should be kept in mind that both births and fetal deaths of Delaware residents are reported regardless of state of occurrence, while induced terminations are reported for only those that occur in Delaware.

**POPULATION PROJECTIONS:** The state, county and city population figures used in this report are estimates and projections produced by the Delaware Population Consortium (DPC). The DHSC is a member of the DPC and supplies birth and death data used in making the projections. Copies of the most recent projections for Delaware's population by age, race, sex, and geographic location are available at <http://www.cadsr.udel.edu/demography/consortium.htm>.

### **RATES**

Absolute counts of births and deaths do not readily lend themselves to analysis and comparison between years and various geographic areas because of differences in population characteristics (e.g., age, sex, and race). In order to account for such differences, the absolute number of events is converted to a relative number such as a percentage, rate, ratio, or index. These conversions are made by relating the number of events to the population at risk in a particular area at a specified time.

Precautions should always be taken when comparing any rates based on vital events. Both the number of events and the characteristics of the population are important to take into account when interpreting a rate. In general, rates will not be presented for events which have numerators less than 20, or

in cases where the population estimates are not produced by the Delaware Population Consortium (DPC).

All statistics are subject to random variation. Rates based on a relatively small number of events tend to be subject to more random variation than rates based on a large number of events.

In addition to the problem of small numbers, demographic characteristics of populations (i.e., age, race and sex) can affect the comparability of rates. Since mortality rates vary substantially by age, race and sex, comparisons between rates from populations that differ in these characteristics could be misleading. However, there are two methods that can be used separately or in combination to improve the comparability of mortality rates. The first method involves comparing rates for specific age, race, and/or sex groups in the populations of interest. With this method, the rates are easily calculated and very specific groups may be compared. However, when very specific groups are compared the numbers are often small, and relationships between the overall populations are difficult to determine.

The second method is a more sophisticated technique that statistically "adjusts" for demographic differences between populations and allows direct comparisons between overall population rates. The major disadvantages of adjusted rates are that they can be cumbersome to calculate without the aid of a computer and they only have meaning when compared to other rates adjusted in the same manner.

### **RACE**

All Delaware vital records contain an item(s) regarding race. Race is self-reported in all records except on death certificates where it is provided by an informant. Although the question allows for a free form response, all race data are grouped for purposes of data analysis into the following categories established by the National Center for Health Statistics:

*White*

*Black*

*American Indian/Aleut/Eskimo*

*Chinese*

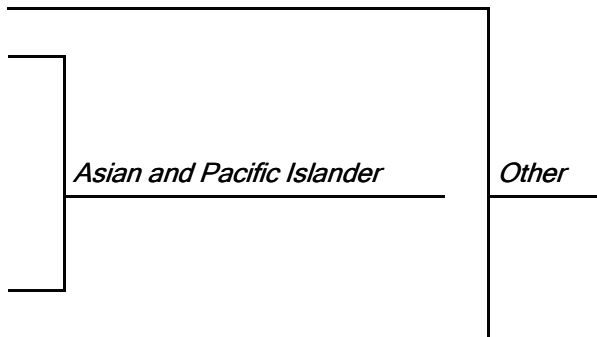
*Japanese*

*Hawaiian*

*Filipino*

*Other Asian or Pacific Islander*

*Other*



The categories *Chinese*, *Japanese*, *Hawaiian*, *Filipino*, and *Other Asian or Pacific Islander* can be combined to form the category *Asian or Pacific Islander*. For purposes of this report, *American Indian/Aleut/Eskimo*, *Chinese*, *Japanese*, *Hawaiian*, *Filipino*, *Other Asian or Pacific Islander*, and *Other* have been combined to form the category *Other*.

In the case of death, race of decedent from the death certificate is reported in all tables except in the birth cohort (see next paragraph). However, in the case of birth and fetal death, race is indicated on the birth and fetal death certificates for the mother and father only (i.e., race of the newborn is not given). Consequently, birth and fetal death data are reported by race of the mother in most tables throughout this report. However, some tables containing historical birth data prior to 1989 are reported by race of child. For these tables, race of child was imputed using criteria established by NCHS.

In the birth cohort section of this report, birth certificate data for infants dying in the first year of life are combined with information from their death certificates. Therefore, data are available for race of the mother and race of the deceased infant for each case. In the vast majority of these cases, the race listed for the mother and infant are the same. However, in a small number of cases the race of the mother and infant differ. In order to maintain consistency with data in the natality section, race of the mother is used for all tables in the birth cohort section.

**HISPANIC ORIGIN**

Beginning in 1989, a specific question regarding Hispanic origin was added to the birth and death certificates. This question is considered to be separate from the Race question. Therefore, a person may report

Hispanic origin in combination with any race category. The Hispanic question has two parts. The first simply asks whether the person is of Hispanic origin (Yes or No). The second part is a free-form item that asks for the specific origin (e.g., *Cuban, Mexican, Puerto Rican, etc.*).

### **SOURCE OF PAYMENT FOR DELIVERY**

Beginning with the 1991 data year, the Center began obtaining information regarding the source of payment for delivery on birth certificates (private insurance, Medicaid, and self pay). However, this information was not available for Delaware resident mothers giving birth in other states (approximately 5 percent of all resident births). For purposes of this report, all such mothers were assigned to the private insurance category. This assignment was based on detailed analyses of the characteristics of these mothers. These analyses indicated that the demographic characteristics of these mothers very closely matched the characteristics of Delaware resident mothers who gave birth within the State and had private insurance listed as their source of payment. Furthermore, an examination of Medicaid data indicated that it is extremely rare for Medicaid mothers to give birth out-of-state.

### **2000 POPULATION STANDARD**

Beginning with the 1999 report, all mortality rates were age-adjusted using the projected 2000 U.S. population standard. All previous versions of the vital statistics report used the 1940 U.S. population standard from the census of the same year. All historical mortality data have been adjusted to the new standard to allow comparisons over time. Comparisons between rates using the old standard and the new standard are not valid and should not be made.

A more detailed explanation of the rationale for updating the population standard can be found in a special report from NCHS (Anderson and Rosenberg, 1998).

**RANDOM VARIATION**

In this report, the number of vital events represent complete counts for the U.S., Delaware, and county populations. Therefore, they are not subject to sampling error, although they are subject to certain errors in the registration process such as age misreporting. However, the number of events and the corresponding rates are subject to random variation. That is, the rates that actually occurred may be considered as one of a large number of possible outcomes that could have arisen under the same circumstances (National Office of Vital Statistics, 1961). As a result, rates in a given population may tend to fluctuate from year to year even when the health of the population is unchanged. Random variation in rates based on a relatively small number of events, tends to be larger than for rates based upon events that occur more frequently. Delaware rates for some events (e.g., infant deaths) are particularly subject to such variations due to the small number of events that occur by definition in a relatively small population. Therefore, caution should be exercised when drawing conclusions about rates based on small numbers.

The issue of random variation was addressed in three ways in this report. First, multi-year average rates were reported instead of annual rates. This tended to reduce the effects of random variation since the number of events in a five-year period was much larger. Second, tests of statistical significance were used to make comparisons between rates when appropriate. These statistical tests were used to determine the chance that the observed differences would occur in populations with equal rates by random variation alone. The methods used to calculate confidence intervals and compare rates are shown in Appendix B. Third, in accordance with the policy of NCHS rates based on fewer than 20 events were suppressed due to the fact that the rate would not be considered statistically reliable.

METHODS FOR CALCULATION CONFIDENCE INTERVALS AND TESTING DIFFERENCES  
BETWEEN TWO RATES

INFANT MORTALITY RATES

Confidence intervals for rates based on fewer than 100 deaths:

$$LCL = R_1 * L(.95, D_{adj})$$

$$UCL = R_1 * U(.95, D_{adj})$$

$$\text{where } D_{adj} = \frac{D * B}{D + B}$$

*L and U are upper and lower confidence factors based on a gamma distribution with parameter  $D_{adj}$ .*

Confidence intervals for rates based 100 or more deaths:

$$R_1 \pm 1.96 * SE$$

$$\text{where } SE(R_1) = R_1 * \frac{RSE(R_1)}{100}$$

$$\text{and } RSE(R_1) \equiv 100 * \sqrt{\left(\frac{1}{D} + \frac{1}{B}\right)}$$

*Comparison of two infant mortality rates* - When the number of events for one or both of the rates was less than 100, comparisons between rates were based on the confidence intervals for each. If they overlapped, the difference was not significant. When the number of events for both rates was 100 or more, the following z-test was used to define a significant test statistic:

$$z = \frac{R_1 - R_2}{\sqrt{R_1^2 \left(\frac{RSE(R_1)}{100}\right)^2 + R_2^2 \left(\frac{RSE(R_2)}{100}\right)^2}}$$

If  $|z| \geq 1.96$  then the difference between the rates was statistically significant at the 0.05-level.

MORTALITY RATES

Confidence levels for age-adjusted death rates based on fewer than 100 deaths:

$$LCL = R' * LCF$$

$$UCL = R' * UCF$$

where:

$$LCF = \left[ \frac{\Gamma^{-1}\left(\frac{x^2}{v}, 1\right)\left(\frac{\alpha}{2}\right)}{\frac{x^2}{v}} \right]$$

$$UCF = \left[ \frac{\Gamma^{-1}\left(\frac{x^2}{v} + 1, 1\right)\left(1 - \frac{\alpha}{2}\right)}{\frac{x^2}{v}} \right]$$

*LCF* = Lower confidence level factor

*UCF* = Upper confidence level factor

$\Gamma^{-1}$  = inverse gamma distribution

$x = R'$

$v = \text{var}(R')$

$\alpha$  = alpha level

Confidence intervals for age-adjusted death rates based 100 or more deaths:

$$R' \pm 1.96 * SE(R')$$

where:

$$R' = AADR$$

$$SE(R') = \sqrt{\sum_i \left( w_i^2 * \frac{R_i^2}{D_i} \right)}$$

*Comparison of two age-adjusted mortality rates* - When the number of events for one or both of the rates was less than 100, comparisons between rates were based on the confidence intervals for each. If they overlapped, the difference was not significant. When the number of events for both rates was 100 or more, the following z-test was used to define a significant test statistic:

$$z \equiv \frac{R_1 - R_2}{\sqrt{SE(R_1)^2 + SE(R_2)^2}}$$

If  $|z| \geq 1.96$  then the difference between the rates was statistically significant at the 0.05-level.



## APPENDIX C

### Comparable category codes for selected causes of infant death.

Cause of death	Category codes according to	
	ICD-10 <sup>1</sup>	ICD-9 <sup>2</sup>
Certain intestinal infectious diseases	A00-A08	001-008
Septicemia	A40-A41	038
All other infectious and parasitic diseases	A09-A39,A42-B99	009-033,034.1-037,039-134,136-139,771.3
Endocrine, nutritional and metabolic diseases	E00-E88	240-278
Diseases of the nervous system	G00-G98	320-359
Diseases of the circulatory system	I00-I99	390-434,436-459
Influenza and pneumonia	J10-J18	480-487
All other diseases of the respiratory system	J00-J09,J19-J98	034.0,460-479,488-519
Diseases of the digestive system	K00-K92	520-579
Renal failure and other disorders of kidney	N17-N19,N25,N27	584-589
Other and unspecified diseases of genitourinary system	N00-N15,N20-N23,N26,N28-N98	580-583,590-629
Newborn affected by maternal complication of pregnancy	P01	761
Newborn affected by complications of placenta, cord, and membranes	P02	762
Disorders related to short gestation and low birth weight, not elsewhere classified	P07	765
Slow fetal growth and fetal malnutrition	P05	764
Birth trauma	P10-P15	767
Intrauterine hypoxia and birth asphyxia	P20-P21	768
Respiratory distress of newborn	P22	769
Other respiratory conditions originating in perinatal period	P23-P28	770
Infections specific to the perinatal period	P35-P39	771.0-771.2,771.4-771.8
All other conditions originating in the perinatal period	P00,P03-P04,P08-P09,P16-P19,P29-P34,P40-P96	760-763,772-779
Congenital malformations, deformations, and chromosomal abnormalities	Q00-Q99	740-759
Sudden infant death syndrome	R95	798.0
Other symptoms, signs, and abnormal clinical and lab findings not elsewhere classified	R00-R53,R55-R94,R96-R99	780-796,798.1-799
Accidents	V01-X59	800-869,880-929
Homicide	X85-Y09	960-968

1. International Classification of Diseases, Tenth Revision.

2. International Classification of Diseases, Ninth Revision.

## APPENDIX D

### Comparable category codes for selected causes of death.

Cause of death	Category codes according to	
	ICD-10 <sup>1</sup>	ICD-9 <sup>2</sup>
Diseases of the heart	I00-I09, I11, I13, I20-I51	390-398, 402, 404, 410-429
Malignant neoplasms	C00-C97	140-208
Cerebrovascular diseases	I60-I69	430-434, 436-438
Chronic lower respiratory diseases	J40-J47	490-494, 496
Diabetes mellitus	E10-E14	250
Influenza and pneumonia	J10-J18	480-487
Alzheimer's disease	G30	331.0
Nephritis, nephrotic syndrome, and nephrosis	N00-N07, N17-N19, N25-N27	580-589
Septicemia	A40-A41	038
Intentional self-harm (suicide)	U03, X60-X84, Y87.0	E950-E959
Chronic liver disease and cirrhosis	K70, K73-K74	571
Assault (Homicide)	U01-U02, X85-Y09, Y87.1	E960-E969
Certain conditions originating in the perinatal period	P00-P96	760-771.2, 771.4-779
Congenital malformations	Q00-Q99	740-759
Human immunodeficiency virus (HIV)	B20-B24	042-044
Accidents (unintentional injuries)	V01-X59, Y85-Y86	E800-E869, E880-E929
Essential (primary) hypertension and hypertensive renal disease	I10, I12	401, 403
Aortic aneurysm and dissection	I71	441
Atherosclerosis	I70	440
Other diseases of respiratory system	J00-J06, J30-J39, J67, J70-J98	034.0, 460-465, 470-478, 495, 508-519
Other diseases of circulatory system	I71-I78	441-448
Pneumonitis	J69	507
Parkinson's disease	G20-G21	332
Alcohol-induced deaths	F10, G31.2, G62.1, I42.6, K29.2, K70, R78.0, X45, X65, Y15	291, 303, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 790.3, E860
Drug-induced deaths	F11.0-F11.5, F11.7-F11.9, F12.0-F12.5, F12.7-F12.9, F13.0-F13.5, F13.7-F13.9, F14.0-F14.5, F14.7-F14.9, F15.0-F15.5, F15.7-F15.9, F16.0-F16.5, F16.7-F16.9, F17.0, F17.3-F17.5, F17.7-F17.9, F18.0-F18.5, F18.7-F18.9, F19.0-F19.5, F19.7-F19.9, X40-X44, X60-X64, X85, Y10-Y14	292, 304, 305.2-305.9, E850-E858, E950.0-E950.5, E962.0, E980.0-E980.5

1. International Classification of Diseases, Tenth Revision.

2. International Classification of Diseases, Ninth Revision.

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